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Question:

How does PharmaLens identify a medicine from just an image of a pill strip?

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Answer:

PharmaLens uses a combination of computer vision and optical character recognition (OCR) to identify medicines from pill strip images. When a user uploads or captures an image of a medicine strip, the app first preprocesses the image to enhance clarity—this involves converting the image to grayscale, removing noise, and resizing it for better text extraction.

Once the image is processed, the OCR module—powered by Tesseract or DeepOCR—reads any printed text on the strip. This text usually includes the drug name, dosage, and sometimes manufacturing details. PharmaLens then applies fuzzy matching algorithms to clean up OCR errors and match the extracted text against a local offline medicine database of commonly used drugs.

After matching, the app sends this interpreted drug information to the embedded Gemma 3n model via a structured prompt like:

“You scanned: Paracetamol 500 mg. What are the safe usage instructions and possible risks?”

Gemma then returns plain-language responses including the medicine's use case, correct dosage, misuse risks, and interaction warnings. This entire process is performed **offline**, making it usable in remote areas without internet access, and ensuring user data stays private.

In summary, PharmaLens doesn't just read the label—it understands it using smart OCR, drug matching, and an on-device AI assistant trained for medicine safety.

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Question:

What is PharmaLens in one line?

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Answer:

PharmaLens is an offline AI-powered medicine recognition and safety assistant that helps users identify pills and prevent drug misuse using just a smartphone camera.

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Question:

Who is the intended user for PharmaLens (doctors, patients, pharmacists, etc.)?

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Answer:

PharmaLens is designed primarily for patients, especially in rural or low-literacy areas, where medicine misuse due to misreading labels or confusing pill types is a serious concern. However, it can also assist caregivers, elderly individuals, community health workers, and even pharmacists as a secondary verification tool. The platform is made intentionally simple and offline-friendly so that anyone—regardless of technical background—can use it to scan medicine strips and receive instant safety guidance. Unlike clinical tools tailored for doctors, PharmaLens focuses on empowering everyday users to make informed decisions about their medications, reducing the risk of overdose, harmful interactions, or confusion between similar-looking drugs.

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Question:

What problem does PharmaLens solve for its users?

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Answer:

PharmaLens addresses the widespread and dangerous issue of medicine misuse in areas where literacy, access to pharmacists, or understanding of drug labels is limited. Many users accidentally take incorrect dosages, combine conflicting medications, or misidentify similar-looking pills. This can lead to side effects, treatment failure, or life-threatening situations. PharmaLens solves this by letting users simply scan a pill strip or blister pack using their phone. The system uses OCR to read the drug label, matches it against a trusted local database, and then uses Gemma 3n to check for risks, correct usage, and interaction warnings—all entirely offline. This makes it a life-saving tool for communities that lack medical guidance or consistent internet access.

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Question:

What are the main features of PharmaLens?

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Answer:

PharmaLens offers a suite of privacy-first, on-device features to ensure safe medicine usage. Key features include:

- **Pill Scanner:** Uses the phone camera to capture images of pill strips or blister packs.
- **OCR Label Reader:** Extracts printed drug names, dosages, and expiry details from packaging using Tesseract or DeepOCR.
- **Gemma 3n Verifier:** Analyzes drug data using structured prompts to provide warnings, dosage info, and safety checks.
- **Interaction Checker:** Alerts users if a scanned drug could interact dangerously with previously scanned or logged medicines.
- **Offline Mode:** Entire system runs locally—no cloud storage or internet required.
- **Voice Mode (optional):** For visually impaired or elderly users, PharmaLens supports voice input and audio guidance.
These features work together to make medicine usage safer, smarter, and accessible even in remote or low-connectivity environments.

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Question:

Is PharmaLens free to use?

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Answer:

Yes, PharmaLens is completely free to use. The platform is being developed with a mission to promote health equity and prevent medicine-related accidents, especially in underserved areas. Since all processing happens locally on the device—with no cloud dependency, subscriptions, or ads—users can access full functionality without any cost. The offline nature of the tool also means there are no hidden charges for data usage or backend services. Whether it's scanning a medicine strip, checking for interactions, or verifying dosage instructions, every feature in PharmaLens is accessible at no cost, making it an ideal solution for communities where affordability is crucial.

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Question:

How do I upload a prescription on PharmaLens?

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Answer:

Uploading a prescription or pill strip image on PharmaLens is simple and doesn't require any technical skills. When you open the PharmaLens app, you'll see an option to either **upload an image** from your device gallery or **capture one instantly using your phone's camera**. Just tap the upload or camera button, and select or snap a clear photo of the medicine strip, label, or prescription. The system is designed with minimal steps so users—especially in low-literacy or non-technical communities—can complete the scan easily. Once uploaded, PharmaLens automatically processes the image through its offline OCR engine and AI-powered drug safety checker.

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Question:

What happens after I upload an image?

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Answer:

After you upload an image of a pill strip or prescription, PharmaLens initiates an automated, offline analysis pipeline. First, the app uses OCR (Optical Character Recognition) powered by Tesseract or DeepOCR to extract any printed text—like the drug name, dosage, and expiry date. Next, this text is cleaned up using fuzzy matching algorithms to correct misspellings and matched to entries in the local drug database. The extracted drug information is then passed to the Gemma 3n model via a custom prompt asking it to verify dosage, warn about possible interactions, and provide safety instructions. Finally, you receive a simple summary screen showing whether the drug is **safe**, requires **caution**, or poses a **danger**, along with plain-language guidance. All of this happens **on your device**, without internet.

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Question:

What formats of prescriptions or images are supported?

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Answer:

PharmaLens supports all common image formats including **JPG, JPEG, PNG, and BMP**. Whether you're uploading a scanned prescription, a smartphone photo of a blister pack, or a printed label, the system is designed to handle varying quality and formats. You don't need to worry about file size or resolution—basic clarity and legibility are enough. If the image includes printed text that is not too blurry or cropped, the OCR

module will process it effectively. While handwriting recognition is not a core feature at this stage, PharmaLens excels at reading printed medicine labels on strips, boxes, or prescriptions with standard fonts.

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Question:

Do I need to register to use PharmaLens?

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Answer:

No, you do not need to register or create an account to use PharmaLens. The app is designed to be **completely anonymous** and **privacy-first**. There is no login, no data collection, and no cloud-based tracking. All medicine analysis and AI processing happens locally on your device, which means your activity remains private and unrecorded. This zero-registration model ensures accessibility for users in rural areas who may not have email access or digital literacy, while also protecting sensitive health data from third-party exposure. Just install the app or open the interface and start scanning—no personal information is required.

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Question:

How long does it take to get results?

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Answer:

PharmaLens provides results almost instantly—usually within **3 to 5 seconds** after image upload. Once the image is submitted, the OCR module quickly extracts the text, which is then processed by the Gemma 3n model to generate a safety summary. Since everything runs locally (no network calls or server delays), the response time is fast even in remote areas with limited connectivity. The app is optimized for lightweight performance, and even on low-spec smartphones or devices, the analysis completes smoothly. So whether you're scanning one pill or multiple, you can expect real-time, offline medicine insights with minimal wait time.

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Question:

How do I upload a prescription on PharmaLens?

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Answer:

Uploading a prescription or medicine strip image on PharmaLens is designed to be extremely simple, especially for users in rural or low-digital-literacy areas. As soon as you open the app or web interface, you'll see an intuitive button that says "**Upload Image**" or "**Scan Now**." You can either select an existing image from your device gallery or use your phone's camera to take a fresh photo of the medicine strip, prescription, or label.

The app is optimized to work well with real-world usage: poor lighting, shaky hands, or even basic smartphone cameras. All you need to ensure is that the text on the medicine packaging—like the drug name and dosage—is reasonably visible. You don't need to crop the image or adjust settings manually; PharmaLens takes care of that during preprocessing.

Once you've uploaded or captured the image, just confirm the input, and the system takes over from there—starting the analysis pipeline instantly and offline. There's no need to register, login, or share any

personal data. The entire experience is built to make it as easy as possible for anyone—elderly users, caregivers, or community health workers—to safely check medicine information without technical hurdles.

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Question:

What happens after I upload an image?

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Answer:

Once you upload or capture an image on PharmaLens, the app activates its smart medicine analysis pipeline—completely offline and on-device. First, the system uses an OCR (Optical Character Recognition) engine—either Tesseract or DeepOCR—to extract text from the image. This includes detecting the medicine name, dosage, manufacturer, and expiry date printed on the strip or label.

Next, the extracted text is passed through a **fuzzy matching** system that corrects minor spelling errors or low-confidence readings (for example, “Paracetmal” is auto-corrected to “Paracetamol”). It then matches the drug name with a local database of commonly used medications stored in JSON or SQLite format.

Once a valid match is found, the medicine details are fed into the **Gemma 3n model** via a prompt specifically designed to query drug safety, dosage guidelines, possible misuse scenarios, and known interactions. Gemma responds with a human-readable, plain-English safety summary, which is then displayed to the user as a **traffic-light style alert**: ✓ Safe, ⚠ Caution, or ✗ Danger.

This entire process—from image processing to AI response—takes just a few seconds and **does not require any internet access**. It ensures that even in remote or low-connectivity areas, users can get accurate, AI-powered insights about their medicines without compromising privacy or speed.

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Question:

What formats of prescriptions or images are supported?

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Answer:

PharmaLens is built to be flexible and user-friendly, supporting all common image file formats including **JPEG (.jpg/.jpeg)**, **PNG (.png)**, and **BMP (.bmp)**. Whether you're uploading a smartphone photo of a blister strip, a scanned prescription from a clinic, or a clear photo of a medicine label, the app can process it effectively.

The key requirement is that the image contains **printed text** (not handwritten), such as the drug name, dosage, or manufacturer info. The built-in OCR module works best when the text is in standard fonts and moderately clear, even if captured in suboptimal conditions like dim lighting or background noise. While handwriting recognition is not currently supported, we've optimized the pipeline to handle noisy, skewed, or slightly blurred images through preprocessing steps such as grayscale conversion, thresholding, and resizing.

PharmaLens does not impose strict file size limits, and you don't need to crop or modify the image before uploading. The app is designed to do the heavy lifting—making it accessible for users who may not be tech-savvy but need accurate medication recognition and safety information fast.

Future versions may include support for PDFs or integrated prescription records, but for now, all major image types used in real-world healthcare contexts are fully supported.

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Question:

Do I need to register to use PharmaLens?

✓

Answer:

No, registration is not required to use PharmaLens. The platform is built with a **privacy-first** philosophy, especially keeping in mind the needs of users in rural areas, elderly populations, and communities with low digital access. When you open PharmaLens, you are not asked to create an account, input an email, or share your phone number. No usernames, no passwords, and absolutely no data tracking.

All features of PharmaLens—including image upload, OCR processing, and drug safety checks through Gemma 3n—are conducted **entirely offline on your device**. That means your data never leaves your phone or tablet. This approach protects your health information and makes the app usable in areas with limited or no internet connectivity.

By removing the need for sign-ups or logins, PharmaLens lowers the entry barrier for all users. It's especially helpful for the elderly, visually impaired, or first-time users who may not be comfortable navigating complex apps. You can simply launch the app, scan a pill strip, and get instant insights—without any digital friction.

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Question:

How long does it take to get results?

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Answer:

PharmaLens is optimized to deliver results in **under 5 seconds** from the moment an image is uploaded. As soon as the user uploads a photo or takes a snapshot, the app immediately starts processing it using fast, lightweight OCR techniques (like Tesseract or DeepOCR) to extract the medicine name and dosage details.

Once the text is extracted, it is matched with entries in the local drug safety database stored on the device. This matching includes fuzzy logic to handle small spelling errors or misreads. The final step is where the Gemma 3n model kicks in—it receives a custom-built prompt and generates a plain-language response that includes dosage guidance, interaction warnings, and safety risks.

Because all of this happens locally—with no internet access or cloud dependency—the response time is consistently fast, even on mid- or low-end devices. The overall experience feels real-time, giving the user confidence and clarity without delays. Whether you're checking one pill or scanning multiple medicines, the system is designed for **instant, offline analysis** that supports time-sensitive health decisions

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Question:

How accurate is the OCR model in detecting medicine names?

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Answer:

PharmaLens uses a robust OCR engine—either **Tesseract** or **DeepOCR**—combined with image preprocessing techniques to detect medicine names with a high degree of accuracy in real-world conditions. Before OCR is even applied, the app enhances the image using methods like grayscale conversion, thresholding, and resizing, which dramatically improve the clarity of printed text even from low-quality images or dimly lit environments.

The OCR engine is trained to focus on structured label formats typically found on blister strips and packaging. It performs especially well when the medicine name is printed in standard fonts. Even when there are small misreads—like confusing "0" with "O"—PharmaLens applies **fuzzy matching** and spelling correction algorithms to identify the most likely correct drug name from the offline database.

While no OCR system is 100% perfect, especially with damaged or very blurry labels, PharmaLens is engineered to work in challenging environments with constrained hardware. In internal testing, accuracy for printed medicine names exceeded **90%**, with further improvements from the fuzzy matcher bringing it close to real-world usability. Additionally, the app offers a **rescan** option and drug confirmation prompt, allowing users to double-check or override suggestions if needed—ensuring safety always comes first.

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Question:

Can PharmaLens match OCR results with real-world drug data?

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Answer:

Yes, PharmaLens is specifically designed to match OCR output with real-world drug data using a **local offline medicine database** and **smart matching logic**. After the OCR engine extracts the raw text from a medicine strip—such as “Paracetmol 500mg”—the app doesn't just assume it's correct. Instead, it uses **fuzzy string matching algorithms** like Levenshtein distance to compare the scanned name with known entries in its drug database.

The database, stored as a JSON or SQLite file, includes a curated list of commonly used medicines along with their dosage, usage, interactions, and warnings. This means that even if the OCR result is slightly incorrect or misspelled, PharmaLens can still recognize the intended medicine. For example, if the text says "Paracetmal," the fuzzy matcher will correctly suggest "Paracetamol" and pull in the relevant data.

This intelligent mapping allows the system to function reliably even with imperfect image inputs. It also helps in **disambiguating similar-sounding drugs** or **generic versus brand name recognition**, which is critical in avoiding misuse.

The real strength of PharmaLens lies in combining this smart matching with the reasoning capabilities of Gemma 3n, which processes the final medicine name and delivers usage instructions, risks, and warnings—all without relying on internet or cloud services.

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Question:

What kind of information is shown about each medicine?

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Answer:

When a medicine is successfully identified, PharmaLens provides a detailed yet user-friendly safety summary designed to empower non-medical users to make informed decisions. The information includes:

- **Drug Name and Dose:** The matched result from OCR and fuzzy matching.
- **Use Cases:** What the medicine is generally prescribed for (e.g., fever, pain relief).
- **Dosage Guidelines:** Recommended daily dosage limits and time intervals.

- **Misuse Risks:** Common overuse or side effects (e.g., liver damage from overusing paracetamol).
- **Drug Interactions:** Alerts if this drug may cause harm when combined with other scanned or known medications.
- **Special Warnings:** Cautions for specific user groups such as elderly patients, people with liver/kidney conditions, or those who are pregnant.

This summary is generated by prompting the **Gemma 3n** model with structured drug information, allowing it to explain complex medical interactions in plain English. The results are color-coded (Safe, Caution, or Danger) so that even users without medical backgrounds can understand them instantly.

Everything is processed **on-device**, and no internet is required, which ensures accessibility and privacy even in rural or low-resource settings. This kind of feedback loop—between the OCR, drug DB, and LLM—makes PharmaLens more than just a label reader. It becomes a safety assistant in your pocket.

Question:

What if a medicine is not found in the database?

Answer:

If a medicine scanned through PharmaLens is not found in the local database, the app will **gracefully handle the case** by informing the user that the drug is unrecognized and offering next steps. The system is designed to never leave the user guessing or at risk.

First, if the OCR result does not match any entries in the local database (even after fuzzy matching), the app will return a message like:

“This medicine is not in our local database. Please double-check the image or try scanning again.”

The user will then be given options to:

- **Rescan the image**, in case of OCR error.
- **Manually enter the drug name**, for advanced users.
- **Ask the AI for general info**, if partial data is available (e.g., just the drug name but no structured DB entry).

If some partial data is still captured—such as just the name but not dosage—PharmaLens can still send a fallback prompt to **Gemma 3n**, asking it to analyze based on general knowledge. For example:

“User scanned: Acemetacin. No local data found. What is it used for? Risks?”

This fallback allows the app to provide value even beyond its local drug DB, while maintaining transparency about data limitations. Over time, you can also update the database to include more drugs based on usage patterns.

Question:

Can PharmaLens detect expiry dates or dosages?

✓ Answer:

Yes, PharmaLens is capable of detecting both **dosage information** and **expiry dates** from scanned medicine images, thanks to its built-in OCR engine and preprocessing logic. When a user uploads a photo of a pill strip or label, the system extracts all visible text fields—this typically includes the **drug name, strength (e.g., 500 mg), batch number, and expiry date (e.g., EXP 08/2025)**.

The OCR module uses layout detection and regular expression patterns to isolate numeric dosage values and standard date formats. For example, if it sees "Paracetamol 500mg EXP: 06/24," it parses both pieces and includes them in the structured result.

Once dosage is extracted, the system checks it against the **local drug database** to verify whether it's within safe limits. If the dosage seems too high or doesn't match the standard for that drug, Gemma 3n is prompted with a warning-check query like:

"User input: Paracetamol 1500mg. Is this safe?"

For expiry dates, if the current device date indicates that the medicine is expired, the app shows a warning like:

"⚠ This medicine may be expired. Please check packaging carefully before use."

This helps users avoid using ineffective or potentially harmful medications. While detection depends on label clarity, the system handles most standard print formats well—and does all this offline, right on the device.

? Question:

Is PharmaLens fully offline, or does it need an internet connection?

✓ Answer:

PharmaLens is designed to be **100% offline**, ensuring complete accessibility and privacy for users regardless of their location or internet availability. From the moment a user opens the app to the final drug safety result, every process—including image scanning, OCR text extraction, fuzzy matching, and even AI-based reasoning with Gemma 3n—runs entirely on the device.

There are no server calls, no cloud-based processing, and no data uploads. This offline-first approach is particularly crucial for rural areas, disaster zones, or communities where consistent connectivity is a challenge. It also ensures that users retain full control over their health data, as nothing leaves their device.

To make this possible, PharmaLens includes:

- An embedded **drug database** (stored as a local JSON or SQLite file).
- An **on-device OCR module** (Tesseract or DeepOCR).
- Integration with **Gemma 3n via Ollama**, allowing the LLM to run locally using lightweight system resources.

The result? Users get near-instant, AI-powered medicine safety analysis **without needing Wi-Fi or mobile data**. This makes PharmaLens not just convenient but also a dependable health tool in low-resource settings.

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Question:

Does PharmaLens store any of my personal data?

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Answer:

No, PharmaLens does **not store or transmit any personal data**. The platform is built around a **privacy-first philosophy** where user safety, anonymity, and data protection are at the core. You are never asked to create an account, input your name, share your phone number, or provide any form of identity.

All interactions—image scanning, OCR reading, drug lookup, and AI-based safety checks—happen entirely offline, on your local device. This means:

- No cloud storage
- No analytics tracking
- No third-party integrations that can access your data

Even the scan history (like previously scanned medicines or flagged warnings) is stored locally and optionally. If included, it can be cleared at any time by the user.

This makes PharmaLens an ideal choice for people who are concerned about digital privacy, medical confidentiality, or surveillance. In environments like shared community phones or clinics, this privacy-first architecture ensures that no personal health data is ever exposed—offering peace of mind alongside powerful functionality.

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Question:

What is the purpose of the voice assistant in PharmaLens?

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Answer:

The voice assistant in PharmaLens is designed to improve **accessibility and usability** for individuals who may face difficulties reading or navigating the app—such as **elderly users**, people with **visual impairments**, or those with **low literacy**. It enables users to interact with the app using their voice instead of tapping or typing, making the experience more natural and inclusive.

Using speech recognition, users can **speak the name of a medicine** they want to verify. PharmaLens will process the input offline, convert the spoken words into text, and then proceed through its usual safety checking flow: fuzzy match the name, cross-reference the local drug database, and prompt Gemma 3n to generate warnings, dosage info, and interaction risks.

Once the results are ready, the app can also **read the response aloud** using a text-to-speech system, available in multiple languages like Hindi, Tamil, or Marathi—making it helpful for users who may not be fluent in English.

This voice mode complements the image-based workflow and doesn't replace it. It is particularly helpful in cases where scanning is difficult or the medicine strip is unlabelled but the user remembers the name. By

giving users multiple input modes—text, image, and voice—PharmaLens ensures it remains useful across different demographics, literacy levels, and device types.

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Question:

How does PharmaLens check for drug interactions?

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Answer:

PharmaLens checks for drug interactions using a combination of local rule-based logic and AI-powered reasoning via the embedded **Gemma 3n** model. Here's how it works:

When a user scans or inputs a medicine, PharmaLens not only identifies the drug and its dosage but also **keeps track of previously scanned or logged medicines** (stored locally). Then, the app checks for potential conflicts by referencing an **offline interaction matrix**—a curated dataset that lists known risky drug combinations, such as “Paracetamol + Alcohol” or “Ibuprofen + Aspirin.”

If a scanned drug matches an entry in this matrix, the app flags it with a warning. But the real strength comes from the AI layer. PharmaLens prompts Gemma 3n with a structured query like:

“The user is taking Drug A and Drug B. Are there any risks or contraindications?”

Gemma responds with plain-language advice based on known pharmacological behavior, side effects, and user conditions (e.g., liver disease, elderly age). The interaction logic is displayed to the user using a color-coded warning system:

- Safe
- Caution
- Dangerous

This dual approach—local rule-checking + AI interpretation—ensures both speed and depth. It gives users accurate interaction feedback even offline, while accounting for real-world complexities like age or health history, making PharmaLens a trusted safety companion.

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Question:

Where is medicine and scan data stored in PharmaLens?

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Answer:

PharmaLens stores all medicine data and scan history **locally on the user’s device**, never on a remote server or cloud. This design ensures user privacy, offline availability, and full control over data.

There are two main storage components:

1. **Local Drug Database:** Stored as a JSON or SQLite file, this contains structured data for each medicine—name, dosage, interactions, warnings, and more. This database is bundled with the app or updated manually when needed.

2. **Scan History (Optional):** If enabled, PharmaLens keeps a local log of previously scanned or inputted medicines. This history allows the app to check for drug interactions across sessions. However, users can delete this history at any time, and it never leaves the device.

Even prompts sent to the **Gemma 3n model** are generated and processed locally through the Ollama integration, which runs the language model directly on-device. No text is uploaded or shared externally.

This storage approach ensures compliance with strict privacy standards and makes PharmaLens suitable for healthcare use cases in sensitive environments—like public clinics or rural outreach centers—where internet access is unreliable and privacy is essential.

Would you like the next batch for a **custom Q&A** section (like legal disclaimer, usage responsibility, or update process)? Or shall I generate **FAQ-ready samples** for **project documentation, policy pages**, or **user onboarding chat flows** next?

Absolutely! Here's the next Q&A block for the "**Chatbot & AI**" section, written in 250–300 words per answer and perfectly suited for **Gemma 3n chatbot training or documentation**. These entries maintain a clear, trustworthy, and educational tone to set realistic expectations for users while showcasing PharmaLens' AI capabilities.

❓ Question:

What can the PharmaLens chatbot help me with?

✓ Answer:

The PharmaLens chatbot is designed to act as an intelligent, offline health assistant that provides clear, human-like guidance related to medicines and their safe use. Its primary role is to explain drug information in plain language based on user inputs such as scanned labels, typed medicine names, or spoken commands.

Here's what the chatbot can help with:

- **Explain a medicine's purpose** (e.g., "What is Paracetamol used for?")
- **Clarify correct dosage** based on general health guidelines.
- **Warn about common side effects**, overdose risks, and misuse.
- **Flag dangerous drug interactions** based on your scan history or combined inputs.
- **Provide safety advice** for vulnerable groups like elderly patients, pregnant individuals, or those with liver/kidney issues.

The chatbot is also capable of handling **multi-turn conversations**, such as:

“Is it safe to take Paracetamol with Ibuprofen?”

“What if I have liver disease?”

“What’s the max daily dose?”

It does **not** replace professional medical guidance but serves as a safety net, especially in settings with limited healthcare access. All responses are generated locally and personalized based on your inputs and the offline drug database.

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Question:

What model is used for the chatbot?

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Answer:

The chatbot in PharmaLens is powered by **Gemma 3n**, a compact, on-device large language model (LLM) deployed using the **Ollama framework**. Gemma 3n is capable of reasoning over structured prompts to provide drug safety insights, misuse warnings, and dosage clarifications—all without requiring an internet connection.

The version used in PharmaLens is optimized for **lightweight offline deployment**, often using Gemma 2B or 4B depending on device resources. This allows the chatbot to work even on low- to mid-range smartphones and laptops. The model is accessed through a backend wrapper that takes structured inputs—like drug name, dosage, user history, and possible interactions—and crafts a natural-language prompt for the LLM.

Example prompt:

“You scanned: Ibuprofen 400mg. Age: 70. History: Stomach ulcers. Is this safe? What are the dosage and risks?”

This combination of local prompt logic, embedded domain knowledge (via your JSON database), and Gemma’s language understanding makes the chatbot a powerful yet private assistant for medication-related queries. It’s not just a search engine—it’s an AI designed for decision support, entirely offline.

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Question:

Can I ask follow-up questions to the chatbot?

✓

Answer:

Yes, the PharmaLens chatbot supports **follow-up questions** in a natural, conversational flow. Once you receive an initial response—for example, about a drug’s purpose or dosage—you can continue the conversation with related queries, and the chatbot will understand the context.

For instance:

User: “Is it safe to take Ibuprofen 400mg?”

Bot: “Yes, for pain or inflammation. Take with food to avoid gastric issues.”

User: “What if I already took aspirin today?”

Bot: “⚠ Caution: Combining ibuprofen with aspirin may increase the risk of stomach bleeding.”

This type of multi-turn interaction is powered by Gemma 3n’s conversational memory within the current session. While PharmaLens doesn’t persist full chat history between sessions (to maintain privacy), it can handle several rounds of Q&A intelligently in a single use cycle.

This is especially helpful for users who may not know how to ask everything in one go or need clarification as new concerns arise. The chatbot is designed to feel like you're talking to a real health assistant, making AI guidance more accessible, especially for elderly or first-time users.

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Question:

What data was used to train the chatbot?

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Answer:

The core model behind the PharmaLens chatbot—Gemma 3n—was pre-trained by Google using a mix of **public domain datasets**, **scientific text corpora**, and **medically relevant language patterns**. However, PharmaLens does not rely on the base model alone. It enhances accuracy and context relevance through **custom prompt engineering** and **an offline drug knowledge base** created specifically for the app.

Here's how the chatbot becomes domain-aware:

-  **Local Drug Database:** Includes structured details on ~50–100 essential medicines, their uses, interactions, and warnings.
-  **Prompt Templates:** Custom-crafted questions like:
“Given drug X and condition Y, what are the safety concerns?”
-  **Few-shot examples:** Used during fine-tuning or prompt boosting, e.g., comparing safe vs. unsafe drug pairings.

No personal user data is used to train the chatbot. All logic for understanding user input—like fuzzy drug name matching, dosage extraction, or health condition flags—is handled locally through scripts that craft intelligent prompts.

So while Gemma 3n provides the language intelligence, PharmaLens augments it with real-world, medical-use-case awareness—without the need to train or fine-tune on sensitive user data.

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Question:

Can the chatbot give me medical advice?

✓

Answer:

PharmaLens does **not** provide medical advice in the traditional sense and should **never replace a licensed healthcare professional**. Instead, the chatbot functions as a **support tool** that gives general guidance based on drug label information, known safety practices, and potential misuse scenarios.

Here's what it **can do**:

-  Explain what a medicine is commonly used for.
-  Provide standard dosage ranges.

- Warn about typical drug interactions or health condition risks.
- Alert you when a medicine appears expired or misused.

But here's what it **cannot do**:

- Diagnose your medical condition.
- Prescribe medications or change your dosage.
- Monitor real-time health symptoms or emergencies.

The chatbot is built for **informational and preventive purposes**, particularly in underserved areas where access to professional advice may be delayed. It's meant to reduce dangerous medicine mistakes, not serve as a complete alternative to medical care.

Users are always encouraged to consult with doctors or pharmacists before making decisions based on the chatbot's output. That's why all answers are phrased carefully and often include disclaimers like "**Consult a doctor if unsure**" or "**This does not replace medical advice.**"

Question:

Does PharmaLens store my uploaded data or images?

Answer:

No, PharmaLens does **not** store your uploaded images or scanned data permanently. The app is built with a strong privacy-first architecture where **all processing happens locally on your device**. When you upload a medicine strip image, it is only used temporarily to run through the OCR (Optical Character Recognition) module and generate medicine-related insights. Once the result is displayed, the image is discarded from memory unless you explicitly choose to save it for your own offline reference.

There's no cloud sync, no image logging, and no hidden uploads in the background. Your image never leaves your phone, laptop, or whatever device you're using. This ensures that even sensitive prescription data remains fully private and inaccessible to anyone else—including us.

For advanced users who enable scan history (optional), basic drug names and safety results may be stored locally in a secure file—but never the image itself. You can clear this history at any time through the settings panel.

In short, PharmaLens gives you full control. If you choose not to store anything, the app acts like a “read-only lens” into your medicine safety—private, temporary, and self-contained.

Question:

Is my medical data shared with third parties?

Answer:

Absolutely not. PharmaLens does **not** share, transmit, or sell any medical data to third parties—because it never even collects it in the first place. Unlike many health apps that rely on cloud services or background analytics, PharmaLens operates in **strict offline mode**, meaning no internet connection is required and no data ever leaves your device.

There are no tracking scripts, advertising SDKs, or analytics integrations bundled into the app. We don't ask for your phone number, email, or identity, and we don't track your location, scan history, or device behavior. Even your scan results are processed and stored locally, only if you explicitly enable the scan log feature.

This design was intentional. PharmaLens was built for communities where privacy is critical—whether due to medical sensitivity, rural access constraints, or shared device environments. Even if someone were to access your phone, there would be no record of your interactions unless you chose to save them.

We adhere to a zero-data philosophy: **no collection = no sharing = no risk**. Your health data belongs to you, and PharmaLens makes sure it stays that way.

?

Question:

How does PharmaLens ensure user privacy?

✓

Answer:

PharmaLens ensures user privacy by following a **zero-data, offline-by-design** approach from start to finish. Unlike typical mobile health apps that rely on cloud APIs, registration, or device analytics, PharmaLens performs all operations—OCR, drug matching, safety checks, and AI prompts—**locally** on your device.

Here's how it safeguards your privacy:

- **No Login Required:** You never have to create an account or provide any personal information.
- **Local AI Processing:** The embedded Gemma 3n model runs entirely offline via Ollama, so your data never leaves your phone.
- **No Cloud Storage:** Uploaded images are processed in RAM and never saved unless you explicitly choose to.
- **No Ads, No Tracking:** There are no third-party SDKs, trackers, or behavioral analytics tools embedded.

Even optional features like scan history are stored in a secure, local file and can be wiped at any time through the app settings. No part of your interaction is used for training, profiling, or monetization.

This architecture is especially important for users in rural or public health settings where shared devices are common and internet access is inconsistent. By keeping everything self-contained, PharmaLens not only improves accessibility—it makes trust and safety a core part of its design.

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Question:

Is PharmaLens certified for clinical/medical use?

Answer:

No, PharmaLens is not certified as a clinical or FDA-approved medical device. It is a **preventive tool** intended for educational and safety support purposes only. While it uses AI and offline databases to provide helpful insights into medicine usage, interactions, and risks, it is not a substitute for professional medical diagnosis, treatment planning, or licensed pharmaceutical consultation.

PharmaLens is positioned as a **public health assistant** for communities with limited access to healthcare professionals. It serves as a low-resource aid to:

- Explain medicine usage and dosage basics.
- Warn against dangerous combinations.
- Prevent accidental misuse based on printed information.

We follow ethical development guidelines and align with best practices in AI explainability, offline health tech, and user safety—but we do not currently claim compliance with regulatory standards such as HIPAA, CE-Marking, or FDA 510(k) certification.

A disclaimer is shown in the app to remind users:

“PharmaLens is not a substitute for medical advice. Always consult a doctor or licensed pharmacist for treatment decisions.”

Future versions may undergo regulatory assessment for certain jurisdictions. But for now, it remains a **non-clinical advisory tool** with strong emphasis on privacy, safety, and responsible use.

Question:

Who can I contact for support?

Answer:

If you need help using PharmaLens or have questions, feedback, or bug reports, we're here to support you. You can reach out to the team through the following channels:

-  **Email Support:** pharmalens.ai@gmail.com (*replace with your real email if needed*)
-  **In-App Feedback Button:** Located in the app's settings panel, where users can report scan issues, suggest new features, or submit a medicine that wasn't recognized.
-  **GitHub Issues Page:** If you're using the open-source version, visit our GitHub repository and raise an issue under the “Support” tag.
-  **Documentation Portal (optional):** A link to a knowledge base or FAQ page for quick self-help.

Please note that since PharmaLens is a privacy-first app, we don't have access to your scan history, device logs, or personal data. To assist you effectively, you may need to describe the issue manually or attach a screenshot (optional).

We aim to respond to all inquiries within 24–48 hours and are always looking to improve the experience for users, especially in healthcare-limited settings.

?

Question:

Can I see a history of my uploads and results?

✓

Answer:

Yes, PharmaLens offers an **optional local scan history** feature that allows you to view previously scanned medicines and their safety results. This feature is entirely offline and privacy-focused—meaning your history is stored **only on your device**, never sent to any cloud server or external database.

If enabled, each successful scan logs basic information such as:

- Date and time of the scan
- Medicine name and dosage
- Result status (Safe / Caution / Dangerous)
- Short summary of the AI's safety recommendation

This can be useful for users managing multiple medications, caregivers keeping track of elder patients, or simply for reviewing past interactions. However, the image files are **not saved** unless you choose to do so manually, to preserve privacy.

You can clear or disable scan history at any time from the settings menu, giving you full control over your data. This local log also powers the **interaction checker**, allowing the app to warn you if a new medicine could react dangerously with something you scanned earlier.

?

Question:

Is there a tutorial for first-time users?

✓

Answer:

Yes, PharmaLens includes a simple, built-in **onboarding tutorial** designed to help first-time users understand how to use the app safely and effectively. When you launch the app for the first time, it walks you through the basic workflow with visual tips, voiceover explanations (optional), and sample scans.

The tutorial covers:

- How to scan a pill strip or label using the camera
- How OCR extracts the drug name and dosage
- How the AI assistant evaluates safety and risks

- ⚠ What each traffic light status (Safe / Caution / Danger) means
- 🔒 How your data is kept private and offline

The walkthrough is designed with accessibility in mind—large fonts, high-contrast visuals, and optional audio for users with limited literacy or vision.

You can revisit the tutorial anytime from the “Help” or “Support” section of the app. We’ve kept it lightweight and interactive so users of all ages and backgrounds can learn without needing tech experience. It’s especially valuable in low-literacy settings or when distributing PharmaLens through public health programs.

❓ Question:

What makes PharmaLens different from other apps?

✓ Answer:

PharmaLens stands out from other medicine or health apps in three key ways: **offline functionality**, **AI-powered safety checks**, and **privacy-by-design architecture**.

1. ⚡ **Fully Offline:** Unlike most apps that require internet access to search databases or run AI models, PharmaLens performs everything—image scanning, drug matching, and safety analysis—entirely offline. This makes it ideal for rural, remote, or emergency settings where connectivity is limited or non-existent.
2. 🧠 **Gemma 3n Integration:** The app uses a locally hosted large language model (LLM), Gemma 3n, to interpret drug information in plain English. It not only tells you what a medicine is for but warns about dosage risks, misuse, and interactions with other drugs you’ve scanned.
3. 🔒 **Privacy-First Approach:** There’s no registration, no cloud uploads, and no tracking. Your data stays on your device, and no one—including the developers—can see your scans.

In contrast, many other apps focus on e-prescriptions, pill reminders, or cloud-based databases that trade privacy for convenience. PharmaLens flips that model—by focusing on **accessibility, safety, and trust**, especially for communities with low literacy, limited tech skills, or healthcare inequality.

❓ Question:

Can I use PharmaLens on my mobile phone?

✓ Answer:

Yes, PharmaLens is built with **mobile-first design** in mind and works seamlessly on smartphones. Whether you’re using an Android device or a low-spec feature phone that supports basic apps, the system is optimized to run smoothly without requiring high-end specs or constant internet.

There are two main options for mobile access:

-  **Streamlit-based Web App (POC)**: A simple proof-of-concept UI that works in mobile browsers or progressive web apps (PWAs).
-  **Flutter-based Mobile App (Upcoming)**: A native version in development that will offer faster camera access, offline storage, voice commands, and better accessibility controls.

Both versions support camera integration, local file access, and on-device AI model execution through a lightweight backend.

Mobile users can:

- Scan pills or labels instantly using the camera
- Get immediate results from the embedded OCR and Gemma AI
- Use voice mode for speaking medicine names and hearing safety instructions aloud

The UI is also optimized for **large buttons, contrast-friendly visuals, and multilingual support**—making it highly accessible for elderly users, rural health workers, and first-time smartphone users.

Question:

Are there any limitations users should know?

Answer:

Yes, while PharmaLens is a powerful offline tool, there are a few **known limitations** that users should be aware of to ensure safe and responsible use.

1.  **Printed Labels Only**: The OCR system currently works best with printed text. It may not accurately read handwritten prescriptions or worn-out labels.
2.  **Limited Drug Database**: The offline medicine database includes 50–100 commonly used drugs. Rare medications or country-specific brands may not be recognized.
3.  **No Clinical Certification**: PharmaLens is not an FDA or CE-certified tool and should not replace advice from a doctor or pharmacist. It's an educational, decision-support tool—not a diagnostic system.
4.  **Device Resource Limits**: On very low-end phones, performance may be slower when running the AI model locally. Using Gemma 2B instead of 4B can help mitigate this.
5.  **Language Support**: While the app is being localized into multiple languages, early versions may default to English for AI responses.

These limitations don't reduce PharmaLens' real-world value—especially in offline, low-resource settings—but users should use the tool responsibly and consult professionals when in doubt. Future updates will expand the database, improve speed, and add multilingual and voice-based enhancements.

? 1. Can PharmaLens detect and warn about duplicate medicine scans?

Yes, PharmaLens includes logic to detect when the same medicine has been scanned multiple times within a short period. If a duplicate scan is detected, the app alerts the user to prevent accidental re-dosing or misuse. This is especially helpful for patients managing multiple pills a day or caregivers monitoring others' medicine intake. The detection is entirely offline and based on locally stored scan history.

? 2. How does PharmaLens assist visually impaired users?

PharmaLens includes several features to help visually impaired users: large fonts, high-contrast UI, voice command input, and text-to-speech feedback. Users can speak the medicine name instead of typing or scanning, and the app will read out safety instructions in plain language. It's also compatible with screen readers, making it highly accessible for low-vision or elderly users.

? 3. What should I do if the OCR result is incorrect?

If PharmaLens misreads a label, users can either retry the scan or manually correct the drug name using the edit option. The app also uses fuzzy matching to suggest the most likely match from its database. This makes it easy to recover from imperfect scans without losing access to critical safety checks.

? 4. Can I batch scan multiple pills together?

Yes! PharmaLens allows you to scan multiple pill strips in a single photo. It analyzes each label individually, extracts multiple drug names, and provides a combined report. It even checks for interactions between all the detected medicines—making it useful for caregivers or clinics handling many prescriptions.

? 5. Does PharmaLens support regional language labels?

Yes, PharmaLens is expanding to support OCR in regional languages like Hindi, Tamil, Bengali, and Marathi. With the correct language pack installed, it can recognize non-English scripts. Audio output and text guidance can also be localized to ensure inclusivity for non-English-speaking users.

? 6. What if I scan a damaged or partially torn label?

PharmaLens uses smart preprocessing like grayscale filtering, contrast adjustment, and noise reduction to enhance poorly printed or damaged labels. If part of the text is unreadable, the app tries to fill in the blanks using fuzzy matching and suggests possible medicine names. Users can also manually edit the results.

? 7. Can I export my scan history or safety reports?

Not yet, but export support is coming soon. In future versions, you'll be able to generate offline safety summaries or scan logs in PDF or JSON format. These files will be stored locally and can be shared manually with doctors or caregivers. No data will ever leave your device automatically.

?

8. How does PharmaLens handle generic vs. brand names?

✓ PharmaLens maintains a mapping of popular brand names to their generic equivalents. If you scan a brand name like “Calpol,” it automatically matches it to “Paracetamol” and pulls up accurate dosage and safety information. This prevents confusion and ensures standardization across different labels.

?

9. Can PharmaLens detect over-the-counter (OTC) medicines?

✓ Absolutely. PharmaLens includes a wide list of commonly used OTC drugs like paracetamol, ibuprofen, and antacids. It provides warnings, dosage info, and interaction alerts for these medicines too—helping users self-medicate safely.

?

10. Does the app support barcode scanning on packaging?

✓ Not yet, but barcode/QR code scanning is planned for future updates. It will allow faster, more accurate drug identification, especially in pharmacy or hospital settings where barcode labels are standard.

?

11. Can I search for a medicine without scanning?

✓ Yes, you can manually type the name of a medicine into the search bar if you don't want to scan. The app will still check its offline database and trigger Gemma 3n to analyze dosage, risks, and interactions just like it does for OCR-scanned entries.

?

12. Can the app be used in community health centers?

✓ Definitely. PharmaLens is ideal for use in rural clinics, mobile health units, and community centers. Since it works offline and doesn't collect personal data, it's suitable for shared device use across patients in public settings.

?

13. Is there a high-contrast mode for low-vision users?

✓ Yes, PharmaLens includes a high-contrast theme designed for users with visual impairments. You can enable it in the settings, and it will apply bold fonts, black-white backgrounds, and larger clickable buttons.

?

14. How often is the medicine database updated?

✓ The offline medicine database is periodically updated with common drug entries, brand variants, and new warnings. Updates are bundled with app releases and can also be imported manually if you download the new JSON file. No internet sync is required.

? 15. Does PharmaLens work on low-end phones?

 Yes! PharmaLens is optimized for lightweight performance and works smoothly even on older smartphones with limited RAM and processing power. You can run it with a smaller Gemma 2B model for better speed if needed.

? 16. Can PharmaLens alert me if a medicine is expired?

 Yes, PharmaLens tries to detect expiry dates on strips and checks them against the current device date. If the medicine is expired or close to expiration, it will show a clear  warning to discourage use.

? 17. Can I customize the AI's response language?

 Yes. If you have a multilingual model and language packs installed, the app can deliver responses in regional languages. You can set your preferred output language in settings or change it at any time.

? 18. Does PharmaLens require a user account?

 No accounts, no logins, and no email verification required. PharmaLens is fully anonymous and offline. You open the app and use it directly—no sign-up needed.

? 19. How big is the app in size?

 The app is lightweight—typically under 100MB depending on whether you use Gemma 2B or 4B. Since all models and data run offline, you don't need to download anything on the fly once installed.

? 20. Can the AI identify dangerous dosage levels?

 Yes, the AI checks scanned dosage values against safe limits stored in the local database. If it detects a potentially harmful dose (e.g., too high for age or weight), it will flag it with a clear  Caution or  Danger label.

? 21. Can PharmaLens be used without camera access?

 Yes. You can disable camera permissions and still use the app in text-input mode. Just type the medicine name or choose from a list of previously scanned drugs.

? 22. Does PharmaLens support dark mode?

 Yes. A system-wide dark mode is available for better battery performance and eye comfort during nighttime use.

?

23. What's the difference between Safe, Caution, and Danger alerts?

✓ These are traffic-light alerts from the AI model:

- ✓ Safe: No serious risks detected
 - △ Caution: Possible issues for specific users (e.g., elderly, liver conditions)
 - ✗ Danger: Known interactions or overdoses flagged—seek medical help
-

?

24. Can I request a new drug to be added to the database?

✓ Yes. There's a "Request Missing Drug" button in the app. When tapped, it logs the unknown drug locally so you can share it later with the developer team or pharmacist during database updates.

?

25. Can PharmaLens analyze ayurvedic or herbal products?

✓ Currently, PharmaLens focuses on allopathic and OTC medicines. Ayurvedic and herbal product detection is not yet supported due to lack of standardized label formats and dosage guidelines.

?

26. Can the app detect combination drugs?

✓ Yes. If a medicine contains multiple active ingredients (e.g., Paracetamol + Caffeine), PharmaLens breaks them down and checks for risks across each component.

?

27. Will the AI work if my device is offline for months?

✓ Yes, as long as the app is installed, all logic—including OCR, the drug DB, and Gemma 3n—runs completely offline. You don't need updates to use its core features.

?

28. Can PharmaLens help prevent self-medication?

✓ Yes, one of the app's core goals is to reduce misuse by people self-medicating. It flags potential risks and interactions even with OTC drugs, helping users think twice before combining multiple medicines unsupervised.

?

29. How does PharmaLens avoid false positives?

✓ The app uses a combination of fuzzy text matching, dosage thresholds, and AI verification to reduce false positives. Users can also verify results manually before acting on them.

?

30. Can PharmaLens be used by pharmacists?

 Yes, pharmacists can use PharmaLens as a fast validation tool for medicine names, expiry, and interaction warnings—especially in rural or busy settings. While it's not a replacement for professional tools, it's a valuable second-opinion assistant.

?

1. Can PharmaLens detect and warn about duplicate medicine scans?

 **Answer:**

Yes, PharmaLens has built-in functionality to detect and warn users about duplicate medicine scans. When you scan a pill strip or upload a prescription image, the app stores the details locally in a private log on your device. If the same drug is scanned again within a short timeframe—especially if it includes the same dosage or batch—the system will flag it as a potential duplicate.

This is particularly useful for people managing multiple medications or elderly users who may forget what they've taken. The alert typically says something like: "You've already scanned Paracetamol 500mg today. Please check if you've taken this dose." This feature helps prevent overdosing and reinforces medication safety without overwhelming the user with technical details.

All of this happens completely offline—your scan history never leaves your device. You can view or clear it at any time from the app settings. In future updates, PharmaLens will also let you label certain scans as 'taken' or 'not taken' to better track your medicine schedule.

Duplicate detection, alongside interaction checks and dosage alerts, forms a core part of PharmaLens' mission to empower safe, smart medicine use—especially in regions with limited healthcare access or digital literacy.

?

2. How does PharmaLens assist visually impaired users?

 **Answer:**

PharmaLens is designed with accessibility at its core, and this includes thoughtful support for users who are visually impaired. Recognizing that many users—especially elderly individuals or patients in rural settings—may struggle with vision, the app offers a range of features tailored to make medicine scanning and safety evaluation easier.

First, the interface supports high-contrast themes and large, easy-to-read fonts. Users can increase the font size directly in the app's accessibility settings. This makes reading results easier even on small or outdated devices.

Next, the voice assistant allows users to speak medicine names instead of typing or scanning them. This is particularly helpful for those who have trouble navigating their device's camera or keyboard. Once the input is processed, the assistant reads the results back aloud.

PharmaLens also integrates text-to-speech feedback. After detecting a medicine, the app can read out the dosage, warnings, and AI-generated interaction flags. This is especially useful for those with low literacy or for users who prefer audio-based guidance.

Furthermore, PharmaLens is compatible with Android screen readers like TalkBack. Future versions aim to expand this further by including regional language support, spoken explanations of AI alerts, and gesture-based navigation modes.

Together, these features ensure visually impaired users can use PharmaLens safely, independently, and confidently—without needing to rely on someone else to interpret their medications for them.

?

3. What should I do if the OCR result is incorrect?

Answer:

If PharmaLens produces an incorrect result while scanning a medicine label or strip, there's no need to worry—the app includes a built-in recovery mechanism to handle such cases smoothly. After the OCR (optical character recognition) engine extracts text from your uploaded or captured image, the result is shown to you for review. If you notice a mistake—like a misspelled drug name, dosage error, or unreadable output—you can simply tap the 'Edit' or 'Try Again' option.

PharmaLens allows users to manually correct the medicine name using the keyboard. It also provides real-time suggestions using fuzzy matching algorithms, which try to guess the intended medicine name even when the OCR result is partially wrong. For example, if the OCR misreads 'Ciprofloxacin' as 'Ciproflocin,' the app can still identify it correctly and fetch relevant safety data.

In case of frequent OCR failures, the app suggests steps like improving lighting, avoiding glare, straightening the strip, or using a higher-resolution camera. There's no need for advanced camera skills—the system is optimized for real-world conditions like poor lighting or torn packaging.

This fallback workflow ensures that OCR accuracy issues never block your ability to access essential drug safety information. The experience remains intuitive and reliable, even for non-technical users in high-pressure healthcare scenarios.

?

4. Can I batch scan multiple pills together?

Answer:

Yes, PharmaLens supports batch scanning, which means you can scan multiple pill strips or medicine boxes in a single image. This feature is especially useful for caregivers, hospital staff, or anyone managing several medications at once. When you upload or capture an image with multiple medicine labels, the system intelligently segments the image and extracts text from each distinct label area using multi-region OCR.

Once it has identified all visible drug names, PharmaLens processes each one through its internal database and AI model. You receive an individual safety report for each medicine as well as an overall drug-drug interaction report across all the scanned items. This helps users avoid dangerous combinations and better understand potential side effects from taking multiple drugs together.

Batch scanning saves time and ensures more efficient health management, particularly for users who take medications daily or are caring for elderly patients or children. All this happens offline, ensuring fast results without relying on cloud servers or data uploads.

In future versions, batch scanning will be further optimized with support for horizontal strip orientation and manual correction in case a label is misread or omitted. With this feature, PharmaLens becomes more than just a single-drug checker—it becomes a comprehensive multi-medicine safety assistant.

?

5. Does PharmaLens support regional language labels?

Answer:

PharmaLens is evolving to support medicine labels written in regional Indian languages such as Hindi, Tamil, Bengali, and Marathi. This feature addresses the critical gap in accessibility for users in rural or semi-urban areas where local languages are commonly used on packaging and prescriptions.

The app uses a multilingual OCR engine configured with regional language support. If a label is printed in a native script like Devanagari (used in Hindi), PharmaLens can accurately extract the medicine name and dosage using a trained Tesseract or Gemma-backed module. Once the text is captured, the rest of the system—medicine matching, safety analysis, dosage checks—continues just like in the English version.

This support is especially valuable for elderly users and non-English speakers who find it difficult to interact with healthcare apps written only in English. Additionally, the chatbot and voice assistant features are being extended to understand and respond in regional languages, ensuring a seamless and inclusive experience.

Language localization is more than just translation—it enables trust, comprehension, and safe decision-making. By enabling multilingual functionality, PharmaLens aims to become India's most accessible medicine-safety app, ensuring that language is never a barrier to healthcare.

6. What if I scan a damaged or partially torn label?

Answer:

If you scan a damaged, torn, or faded label, PharmaLens applies advanced image preprocessing techniques to salvage as much information as possible. The app enhances the input image using filters like grayscale conversion, noise removal, brightness correction, and thresholding. These techniques help make faint text more legible to the OCR system.

Once the image is processed, the app attempts to extract medicine names and dosages from the visible sections. If parts of the text are missing or distorted, PharmaLens uses fuzzy string matching against its local drug database to suggest the most likely matches. For instance, if only “Para...” is detected, it may suggest “Paracetamol” as a potential match.

You also have the option to manually fill in missing details or correct partial outputs. This hybrid approach ensures that users aren't blocked by imperfect conditions—such as when labels get wet, scratched, or folded.

PharmaLens is built for real-world use, not lab conditions. It understands that most medicine packages won't be scanned in perfect lighting or straight alignment. Its intelligent recovery mechanisms ensure users still get meaningful, safe, and actionable insights—even from less-than-perfect scans.

7. Can I export my scan history or safety reports?

Answer:

Currently, PharmaLens stores all scan history and safety analysis locally on your device to protect your privacy. However, an upcoming version will allow users to export their scan data, dosage logs, and interaction reports into formats like PDF, CSV, or JSON. These files will be encrypted or password-protected and stored only on your phone.

Exporting is useful for sharing medicine history with doctors, caregivers, or pharmacists—especially during emergencies or follow-up visits. You'll be able to customize what's included in the export, such as specific drugs scanned during a certain time period, or a full report of all flagged interactions.

Importantly, even when exporting is enabled, no data will be sent over the internet. You can choose to share files manually via email, Bluetooth, or USB—completely under your control.

This feature is ideal for chronic patients who need to track long-term medication use, parents managing child prescriptions, or clinics maintaining digital records. It ensures you have complete visibility and ownership of your medication history—without ever compromising privacy.

?

8. How does PharmaLens handle generic vs. brand names?



Answer:

PharmaLens understands that many medicines are sold under different brand names, even though they contain the same active ingredients. To solve this, the app maintains an internal mapping between brand names (e.g., “Calpol”) and their corresponding generic drugs (e.g., “Paracetamol”).

When you scan a label or type a drug name, PharmaLens cross-checks it with both brand and generic entries in its local database. If you enter or scan a brand name, the app automatically links it to its generic counterpart and runs all safety checks based on that. This helps eliminate confusion and ensures that risk warnings are accurate and consistent.

This feature is particularly useful in India where the same drug can be sold by dozens of companies under slightly different brand names. It also helps users understand what they’re actually taking, especially when switching between pharmacies.

Future updates will allow users to search by manufacturer, filter by category, and see all equivalent brand-generic pairs. With this brand-to-generic conversion, PharmaLens becomes not just a safety checker—but also an educational tool for smarter healthcare choices.

?

9. Can PharmaLens detect over-the-counter (OTC) medicines?



Answer:

Yes, PharmaLens includes robust support for over-the-counter (OTC) medicines, recognizing that many users rely on these for self-treatment. OTC medicines like paracetamol, ibuprofen, antacids, antihistamines, and cough syrups are widely used and often misunderstood or misused due to a lack of professional guidance.

PharmaLens has a curated offline database of commonly available OTC products across Indian pharmacies. When a user scans an OTC medicine, the app can still analyze its composition, suggest safety warnings, and detect possible interactions with other drugs—just as it would with prescription medicines. It also checks for maximum daily dosage, common misuse patterns, and age-specific cautions (like not giving aspirin to children under 12).

What makes this feature powerful is that users in rural or semi-urban areas often do not have easy access to pharmacists. Many simply buy medicine based on a friend's advice or past experience. PharmaLens becomes a pocket advisor in such scenarios, helping users avoid common dangers like taking too much of a painkiller or combining multiple cold meds that contain the same ingredient.

This function works entirely offline, so even in areas without internet, people can make informed decisions about OTC usage. It empowers users to take better control of their health while reducing dependency on uncertain, informal medical advice.

?

10. Does the app support barcode scanning on packaging?

✓ Answer:

Currently, PharmaLens does not support barcode or QR code scanning—but this feature is actively in development for a future version. The goal is to enable users to scan the printed barcode or QR code often found on medicine boxes, which can provide faster and more accurate identification of drugs.

Once implemented, barcode scanning will serve as an alternative or backup to OCR (optical character recognition). This is especially helpful in environments where the label is hard to read, or when text is too small or faded. By scanning the code, the app will instantly fetch the drug's generic name, manufacturer, dosage, expiry, and batch number from a locally stored registry.

Pharmacists, hospitals, and telemedicine platforms will benefit greatly from this feature. It will streamline workflow, ensure more precise drug matching, and help maintain consistency in stock tracking or prescription verification.

Unlike many cloud-dependent barcode apps, PharmaLens will use an **offline medicine barcode database**, making it usable in areas with poor or no connectivity. Users won't need to be online to benefit from this feature.

While OCR will remain the default mode for the average user, barcode scanning will offer a fast, frictionless experience for professionals and power users.

?

11. Can I search for a medicine without scanning?

✓ Answer:

Absolutely. PharmaLens is not limited to image-based scanning—you can manually search for any medicine by typing its name into the search bar. This is useful when you don't have the physical strip in front of you, or when the label is too damaged to scan. It's also helpful for verifying a medicine before purchase or confirming something a doctor mentioned.

When you type in a medicine name, PharmaLens will match it against its offline database and pull up dosage guidelines, safety warnings, possible interactions, and special usage instructions (e.g., "not safe during pregnancy" or "use with caution in liver patients"). You can enter either the brand name or the generic name, and the app will intelligently map it to the correct record.

This feature is designed to feel fast and intuitive. Suggestions appear as you type, and you can select from auto-complete options. It's also optimized for misspellings or partial input using fuzzy search logic.

Future updates will make the manual search even more powerful by supporting filtering (e.g., "fever medicines" or "pediatric only"), voice-to-text input, and multilingual queries. This ensures that even users without access to a good phone camera can still benefit from all the powerful AI safety checks PharmaLens offers.

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12. Can the app be used in community health centers?

✓ Answer:

Yes, PharmaLens is ideal for use in community health centers, mobile health clinics, and rural hospitals. Its offline-first architecture makes it especially suited for low-resource settings where internet connectivity is unreliable or unavailable. Health workers can install the app on shared tablets or smartphones and begin scanning medicine strips or prescriptions immediately—without the need for logins, patient registration, or Wi-Fi access.

Community health workers can use PharmaLens to validate the medicines they distribute during home visits or health camps. The AI assistant can also help explain safety precautions to patients who may not be literate or fluent in English. With its voice and text interface, the app can speak warnings aloud in simple language, making it easier for patients to understand what they're being given.

Since the app does not store any user data or images, it's safe for use in settings with multiple patients. The built-in history and duplicate-detection features help track usage without needing to log patient identities.

As an added benefit, future versions of PharmaLens will include localized medicine kits and bulk-scanning features designed specifically for NGOs and rural health missions. These make PharmaLens a scalable solution for public health initiatives aiming to promote safe medicine use at the grassroots level.

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13. Is there a high-contrast mode for low-vision users?

Answer:

Yes, PharmaLens includes a high-contrast mode specifically designed to help users with visual impairments or low vision. You can activate this mode in the app's accessibility settings. Once enabled, the app switches its interface to a dark background with bold white or yellow text, making it easier to distinguish elements even in poor lighting conditions or on small screens.

This mode also enlarges key interface elements such as buttons, input fields, and result highlights. It ensures that critical alerts—like “DANGER” or “CAUTION” labels—stand out clearly. Combined with larger fonts and simplified layouts, high-contrast mode transforms PharmaLens into a tool that is not only functional but empathetic to the real-world challenges faced by many users.

Additionally, this mode works seamlessly with Android screen readers such as TalkBack. For users who rely on audio, the voice assistant can also read out search results, warnings, and dosage instructions, making the experience hands-free.

These accessibility features reflect PharmaLens' commitment to inclusive healthcare. Whether you're a senior with weak eyesight or a caregiver assisting someone with a visual disability, you'll find that PharmaLens doesn't just include accessibility—it prioritizes it.

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14. How often is the medicine database updated?

Answer:

PharmaLens relies on a carefully curated offline medicine database that is updated regularly to include the most current formulations, safety alerts, and drug interactions. While the AI and core logic run entirely offline, the drug information files (e.g., JSON or SQLite format) are bundled with each app update. Typically, this happens every few weeks or monthly—depending on new drugs entering the market, regulatory changes, or flagged interactions by medical bodies.

Updating the database ensures users have access to accurate information regarding dosage limits, new side effect findings, and brand-generic mappings. For example, if a new antibiotic becomes widely used or a combination drug is recalled, these changes are reflected in the next version's offline data package.

Users do not need internet access to check for updates. They can either update the app through their usual app store or sideload the new database manually if using an offline APK. In future versions, we aim to provide “modular” drug data packs so users can download updates specific to their region or specialty (like pediatric drugs or chronic illness kits).

This offline update mechanism ensures that PharmaLens continues to offer world-class drug safety—even in areas where connectivity is poor, unpredictable, or non-existent. It also means the AI remains reliable over time, helping prevent errors from outdated references.

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15. Does PharmaLens work on low-end phones?

✓ Answer:

Yes, PharmaLens is intentionally built to run on low-end and older Android devices, including smartphones with as little as 2GB RAM and limited processing power. This design choice stems from our mission to make medicine safety accessible across India—including in rural, low-income, or underserved communities where the latest smartphones are uncommon.

The core application, including OCR, drug matching, and interaction checking, is optimized to run with minimal system resources. We use lightweight AI models (e.g., Gemma 2B for slower devices and Gemma 4B for faster ones) that strike a balance between speed and accuracy. The image processing and AI interaction all happen locally, eliminating the need for cloud computation, which further reduces load time and power consumption.

PharmaLens also adjusts dynamically based on device capabilities. For example, lower-end devices may use simpler image preprocessing pipelines or limit batch scanning to fewer items. Despite these adjustments, the safety and reliability of the results remain intact.

Additionally, we offer a "Lite Mode" for extremely basic phones. This version uses fewer animations and lower resolution outputs but retains all core functionality.

In short, if your phone can run WhatsApp or YouTube, it can likely run PharmaLens comfortably. This inclusivity ensures that medicine safety is not just a feature for the privileged—it's a basic right for all.

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16. Can PharmaLens alert me if a medicine is expired?

✓ Answer:

Yes, one of the valuable safety features of PharmaLens is its ability to detect expired medicines and warn the user immediately. When you scan a pill strip or prescription, the app's OCR engine looks for expiration dates printed on the packaging. If an expiry date is found, PharmaLens compares it with the device's current date and displays an alert if the medicine is expired or close to expiring.

The alert will typically say something like: “⚠ This medicine expired on 03/2023. Do not use it unless advised by a medical professional.” For medicines with just a few days left until expiration, the system also flags a “use with caution” status, encouraging users to double-check before consumption.

This feature is crucial because many people, especially in rural areas or during emergencies, end up using leftover medicines from old kits. Sometimes expiry dates are partially faded or ignored. PharmaLens acts as a safety net by scanning the strip in real-time and flagging potential health risks due to expired compounds.

Even if the app cannot fully detect the date due to damage or missing text, it will prompt the user to confirm it manually—ensuring that expiry checks are never skipped unintentionally.

This simple but powerful addition can prevent poisoning, reduced efficacy, or complications from degraded medicine—and it works entirely offline.

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17. Can I customize the AI's response language?

Answer:

Yes, PharmaLens is being designed to support multi-language output so users can interact with the AI in their preferred regional language. This customization improves accessibility and trust, especially for users who may not be fluent in English. Initially, English is the default output, but upcoming versions will support Hindi, Tamil, Bengali, Marathi, and other major Indian languages.

When enabled in the settings, the AI responses—such as medicine explanations, dosage instructions, and safety warnings—will be displayed in the selected language. If the device also has text-to-speech packs for that language, the voice assistant will read out those messages in the chosen dialect too.

In addition, the app is planning to support voice queries in multiple languages. For example, a user might speak “Ye dawa pregnancy ke liye safe hai kya?” and the AI would respond in Hindi with contextual awareness of the scanned drug.

This multilingual customization ensures inclusivity and caters to India’s diverse linguistic population. It’s especially important in medical contexts, where misunderstanding even one word can lead to incorrect medicine usage. By supporting local languages, PharmaLens ensures that the technology serves the user, not the other way around.

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18. Does PharmaLens require a user account?

Answer:

No, PharmaLens does not require you to create a user account, register with an email, or log in using any credentials. The entire system is designed to be fully **anonymous**, **offline**, and **privacy-first**. This means you can use all features—from scanning pill strips and checking safety to interacting with the AI—without giving any personal information.

This is a deliberate choice to protect user privacy, especially in rural or underserved communities where digital literacy may be low. Many users are uncomfortable entering phone numbers or emails, especially for health-related apps. By removing the login barrier, PharmaLens makes medicine safety available instantly, to everyone, with zero friction.

Moreover, since there’s no account system, there’s no data being stored in the cloud. Your scans, search history, or voice inputs never leave your device. This also prevents accidental data leaks or unauthorized access.

In the future, optional features like scan history export or clinic usage logs may offer limited storage options, but these will always remain local to your phone and protected with user control.

This no-login model embodies PharmaLens’ commitment to privacy, speed, and accessibility. You shouldn’t need an ID to access life-saving information—and with this app, you don’t.

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19. What if a medicine is not found in the database?

Answer:

If a medicine you scan or search is not found in the PharmaLens database, the app will let you know with a friendly message such as: “This medicine could not be matched with our records.” Rather than ending the process there, PharmaLens gives you a few helpful options to still make use of the tool.

First, you'll be prompted to check the spelling and try manual input—this is useful in case the OCR misread the label. If it's a new or uncommon brand, the app might ask if you want to associate it with a known generic medicine. This helps in cases where a newer brand is just a variation of an existing drug.

PharmaLens also allows users to submit unknown medicine names to a pending review list (offline for now, but cloud support is planned), which helps our team improve the database over time. As more users report rare or new entries, they will be added to the next update.

In the meantime, users can manually enter known components or ingredients from the packaging to get partial safety reports. Even if full details aren't available, the system still tries to offer guidance based on what's entered.

So, even if a medicine isn't recognized immediately, PharmaLens doesn't leave you hanging. It's built to adapt, learn, and offer alternatives to keep your health decisions informed and safe.

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20. Can PharmaLens check for drug interactions?

✓ Answer:

Yes, checking for drug-drug interactions is one of PharmaLens' core features. When you scan multiple medicines together—either in one batch or one by one—the system not only identifies each drug but also analyzes how they may interact with one another inside the body.

These interactions are flagged based on known conflict pairs in its offline safety rules database. For instance, if you scan both "Paracetamol" and "Ibuprofen," the app will likely say it's okay in limited doses. But if you scan "Warfarin" and "Aspirin," the system may raise a red alert due to bleeding risks.

Interaction warnings are color-coded for clarity: green (safe), yellow (use caution), and red (dangerous). The explanation includes what type of interaction is expected—like overlapping side effects, metabolic interference, or increased toxicity.

This feature is particularly useful for patients with chronic conditions who take multiple drugs daily. It can also help avoid unnecessary visits to a doctor for basic cross-checking. Even over-the-counter drugs are included in the interaction system, making it helpful for self-medicating users too.

And remember—this all works offline. No data is sent to a server, and no internet is needed for interaction analysis. You get safety at your fingertips, in real-time.

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21. Can I use PharmaLens in a pharmacy or hospital?

✓ Answer:

Absolutely. PharmaLens is designed to be useful in both personal and professional settings, including pharmacies, small clinics, and hospitals. Pharmacists can use it to verify prescriptions, check for unsafe combinations, and educate patients about potential side effects in real time. Since it works offline, it's a perfect tool even for rural pharmacies that lack stable internet access.

In a hospital setting, PharmaLens can act as a bedside assistant. Staff can quickly scan patient medications to avoid conflicts or verify proper dosage before administration. It's especially helpful during night shifts or in facilities that lack electronic health records.

Moreover, PharmaLens is being structured to support multi-user usage without compromising data privacy. Because the app doesn't collect or store personal information, it can be passed from one patient or staff member to another safely and securely.

Future upgrades will include features like shared access logs (locally), printable safety reports for prescriptions, and custom “kit profiles” for specific medical departments like pediatrics or oncology.

Whether you’re a solo pharmacist in a remote town or a nurse in a city hospital, PharmaLens can become an instant second opinion, helping reduce human error and boosting patient safety in real-world clinical environments.

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22. Does PharmaLens detect dosage errors?

Answer:

Yes, PharmaLens includes logic to detect potential dosage issues based on the scanned or typed medicine label. If you enter or scan a dosage that appears too high or too low for a standard adult, child, or elderly user, the app will raise a yellow or red flag depending on the severity.

For example, if a label says “Paracetamol 1000mg 3 times a day,” PharmaLens may warn you that the total daily dosage exceeds the typical safe limit. Similarly, if you enter “Amoxicillin 125mg for an adult,” the app may suggest confirming the dosage, as it appears low for a typical adult treatment course.

These alerts are based on general-purpose dosing guidelines sourced from publicly available medical literature and drug databases. They’re meant to serve as a **pre-check**—not a substitute for professional advice.

The system is especially helpful for parents administering pediatric doses or elderly patients managing multiple medications. In such cases, incorrect dosages can have serious consequences, and a simple nudge from the app can make all the difference.

In future versions, PharmaLens will allow users to input age, weight, and other factors to get more personalized dose guidance. But even in its current form, the app is a powerful checkpoint for avoiding everyday medication mistakes.

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23. Can I access previous scans offline?

Answer:

Yes, PharmaLens stores your previous scans directly on your device in a fully offline manner. This means you can go back and view your past medicine checks, safety warnings, and interaction results—even if you’re not connected to the internet.

The scan history includes the drug name, dosage, date/time of scan, and any warnings that were issued. It also keeps a list of medicines that were scanned together, so you can review past interaction results as well. All of this is encrypted and saved only on your device—nothing is uploaded or shared externally.

This offline scan history is especially useful when managing long-term prescriptions, tracking recurring side effects, or helping elderly family members. You can also use it to check if you’ve already taken a medicine that day (thanks to the duplicate detection feature).

Soon, we’ll introduce local tagging so you can label scans as “morning,” “night,” “taken,” or “skipped.” These kinds of personal reminders will turn PharmaLens into a lightweight medicine diary—without ever needing to sign in or connect online.

In short, your history is yours alone, stored securely, and always accessible—even in airplane mode.

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24. Can PharmaLens identify herbal or Ayurvedic medicines?

✓ Answer:

Currently, PharmaLens is primarily focused on allopathic (Western) medicines, but support for herbal, Ayurvedic, and traditional medicines is in the roadmap. Many herbal and OTC products are sold with minimal labeling, inconsistent branding, and variable ingredients—making reliable detection more complex.

That said, if an herbal product has a printed label with ingredient names (like “Ashwagandha” or “Brahmi extract”), PharmaLens can still run OCR and allow the user to read or research those components manually. In some cases, the app may offer general information about that herb if it’s part of the extended safety dataset.

We recognize that a large portion of the Indian population uses herbal products alongside standard medicine. That’s why our team is working to create a curated herbal interaction database—so PharmaLens can soon warn about risky combinations like “Turmeric + Warfarin” or “Ginseng + Antidepressants.”

In future updates, expect dedicated support for Ayurvedic products, herbal kits, and cross-system safety guidance. Until then, users can still scan the label, manually input ingredients, and read warnings for those that are already cataloged.

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25. Will PharmaLens work during a power outage or network failure?

✓ Answer:

Yes, PharmaLens is designed to work completely offline and will continue functioning perfectly during a power outage or when your phone has no network access. All the core components—including OCR, medicine identification, drug interaction checking, and AI guidance—are embedded within the app itself and do not rely on external servers.

Whether you’re in a rural village with no connectivity or experiencing a temporary power cut in an urban hospital, PharmaLens remains fully operational. You can scan medicines, check expiry dates, detect interactions, and receive AI explanations without needing electricity, Wi-Fi, or even mobile data.

This offline capability makes PharmaLens uniquely suited for use in disaster zones, medical camps, remote clinics, and low-resource homes. It doesn’t just work when conditions are ideal—it’s built to work when things go wrong.

The only functions that may be temporarily affected during a power or network failure are future-planned features like cloud-based database syncing or optional online updates. But even those are strictly opt-in and not required for day-to-day use.

With PharmaLens, you don’t need to rely on infrastructure—you just need your phone. That’s real accessibility.

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Fake Docs and Tutorials

- Humanlike how-to guides and usage flow for PharmaLens.

Realistic Privacy / Terms Sections

- Trust-building policy Q&A based on your offline, no-cloud architecture.
-

Here's a sample below. Let me know if you want this saved as a downloadable .jsonl or .csv.

Fine-tuning Format (JSONL per sample)

```
{  
  "messages": [  
    {"role": "user", "content": "How do I upload a prescription on PharmaLens?"},  
    {"role": "assistant", "content": "Uploading a prescription or medicine strip image on PharmaLens is designed to be extremely simple, especially for users in rural or low-digital-literacy areas. As soon as you open the app or web interface, you'll see an intuitive button that says \"Upload Image\" or \"Scan Now.\" You can either select an existing image from your device gallery or use your phone's camera to take a fresh photo of the medicine strip, prescription, or label.\n\nThe app is optimized to work well with real-world usage: poor lighting, shaky hands, or even basic smartphone cameras. All you need to ensure is that the text on the medicine packaging—like the drug name and dosage—is reasonably visible. You don't need to crop the image or adjust settings manually; PharmaLens takes care of that during preprocessing.\n\nOnce you've uploaded or captured the image, just confirm the input, and the system takes over from there—starting the analysis pipeline instantly and offline. There's no need to register, login, or share any personal data. The entire experience is built to make it as easy as possible for anyone—elderly users, caregivers, or community health workers—to safely check medicine information without technical hurdles."}  
  ]  
}
```

More Samples

Upload History (Fake Doc)

```
{  
  "messages": [  
    {"role": "user", "content": "Can I see a history of my uploads and results?"},  
    {"role": "assistant", "content": "Yes, PharmaLens offers an optional local scan history feature that allows you to view previously scanned medicines and their safety results. This feature is entirely offline and privacy-focused—meaning your history is stored only on your device, never sent to any cloud server or external database.\n\nIf enabled, each successful scan logs basic information such as the date and time of the scan, the detected medicine
```

```
name and dosage, and a short summary of the AI's recommendation (safe, caution, or dangerous). This is useful for tracking medication history, especially for patients who take multiple drugs or for caregivers managing others' medications.\n\nHowever, to protect user privacy, this feature is optional and can be disabled at any time. You can also manually clear all scan records via the settings menu. PharmaLens never stores your uploaded images-only basic scan results if you allow it to. This gives users control and transparency while still supporting drug interaction checks based on past scans."}  
]  
}
```

Privacy Policy

```
{  
  "messages": [  
    {"role": "user", "content": "Does PharmaLens store my uploaded data or images?"},  
    {"role": "assistant", "content": "No, PharmaLens does not store your uploaded images or scanned data permanently. The app is built with a privacy-first design where all image processing and safety analysis is done locally on your device. Once you upload or capture a photo, it's only used temporarily for OCR and AI evaluation. The image is not saved, uploaded, or shared anywhere.\n\nThere is no cloud processing involved, and the app does not retain any media files unless you explicitly choose to save them for offline reference. Even optional scan history only stores basic medicine names and timestamps locally, and you can clear that history at any time from the settings menu. This makes PharmaLens safe to use even on shared or public devices."}  
  ]  
}
```

Optional Fields You Can Add Later:

- "id" or "source" (e.g., docs/tutorials, privacy-faq)
- "tags" (e.g., ["privacy", "upload", "offline-mode"])
- "confidence" score for data weighting
- "context" field for future multi-turn memory training