Week 2 Report: Hydraulic Assistant

Project Overview

- This week's primary achievement is a functional prototype of the Flutter-based **“Hydraulic Assistant,”** a chat application that answers domain-specific questions using a RAG (Retrieval-Augmented Generation) pipeline.
- Created a cross-platform app (Android, iOS, web, with desktop scaffolding present).
- Initialized Firebase and included authentication screens.

Data and Knowledge

- Established the core knowledge base by embedding domain-specific PDFs, making them accessible to the application for analysis.
- Implemented a simple embedding fallback in embedding_service.dart to generate 384-dimensional vectors when an external model is unavailable.
- Integrated with Pinecone vector database for upserting and querying document embeddings.

LLM and Retrieval

- Implemented the **PineconeGrokService**:
  - Manages upsert/query operations to Pinecone via REST API, using keys and URLs from environment variables.
  - Integrated GROQ for chat completions.
  - Supports streaming completions (SSE) with askGroqStream to yield tokens incrementally.
- These components were integrated to create a complete, end-to-end “answerUserQuery” pipeline: the user's query is embedded, relevant context is retrieved from Pinecone, and both are sent to GROQ to generate an informed answer.

Chat UI/UX

- **ChatPage Features**:
  - Streaming assistant responses with a slow, professional typewriter effect.
  - Enhanced the user experience with intelligent auto-scrolling, which only activates when the user is near the bottom of the chat, preventing jarring screen jumps while they are reading previous messages.
  - Increased message font size for better readability and maintained a consistent red/white theme.
  - Added a top-right “Clear chat history” action with a confirmation dialog and snackbar feedback.
  - Included a network diagnostics dialog that runs quick tests for internet, Pinecone, and GROQ connectivity.

State and Persistence

- Implemented chat history persistence using shared_preferences.
- Messages are saved after each send/receive cycle.
- Chat history is restored on page load, ensuring the conversation remains intact after tab changes or app restarts.

Configuration and Security

- Managed environment variables using flutter_dotenv.
  - Created a .env file for PINECONE_API_KEY, PINECONE_BASE_URL, GROQ_API_KEY, and GROQ_BASE_URL.
  - Developed an EnvConfig wrapper for typed access and validation.
  - Documented and tracked .env.example; .env is ignored via .gitignore.
- Scrubbed all hardcoded secrets from the codebase and provided guidance on key rotation.
- Created ENV_SETUP.md with instructions for setting up environment files.

Testing and Diagnostics

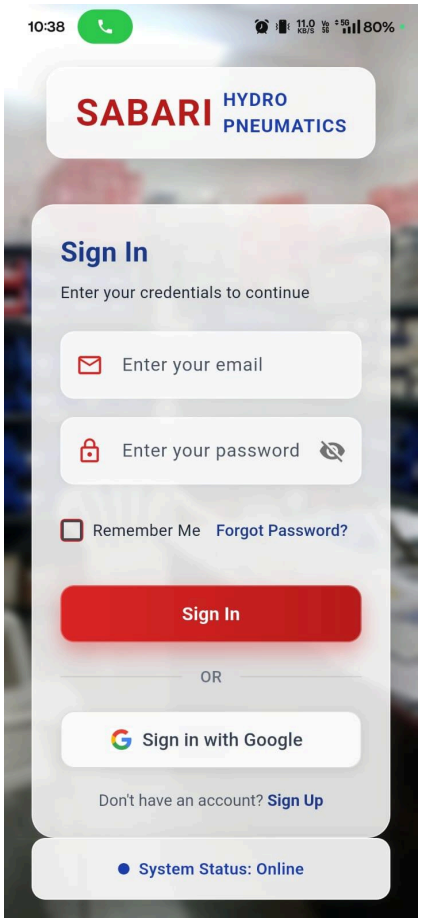
- Developed test_chat_integration.dart to validate embeddings, Pinecone queries, the GROQ API, and the full integration.
- Created network_test.dart for basic connectivity checks against Google, Pinecone, and GROQ.

Notable Files Touched

- **lib/chat_page.dart**: Implemented streaming/typewriter effect, persistence, clear history, font size changes, and scrolling fixes.
- **lib/pinecone_grok_service.dart**: Handled Pinecone + GROQ integration with the streaming API.
- **lib/embedding_service.dart**: Added simple embedding fallback and environment variable usage.
- **lib/config/env_config.dart**: Centralized environment loader and getters.
- **lib/main.dart**: Loads environment variables on startup.
- **pubspec.yaml**: Added flutter_dotenv, shared_preferences, and ensured assets were included.

Current Status

The week concludes with the delivery of a functional, end-to-end RAG chat application for hydraulic topics. The prototype features persistent chat history, secure API key management, and a polished, streaming user experience.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Sign In
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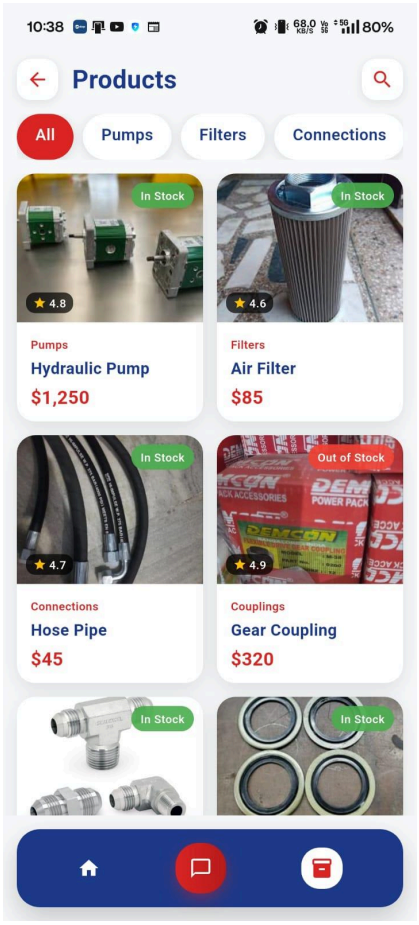
Forgot Password?
Sign In
OR
Sign in with Google
Don't have an account? Sign Up
System Status: Online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Products
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Pumps
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Air Filter
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Gear Coupling
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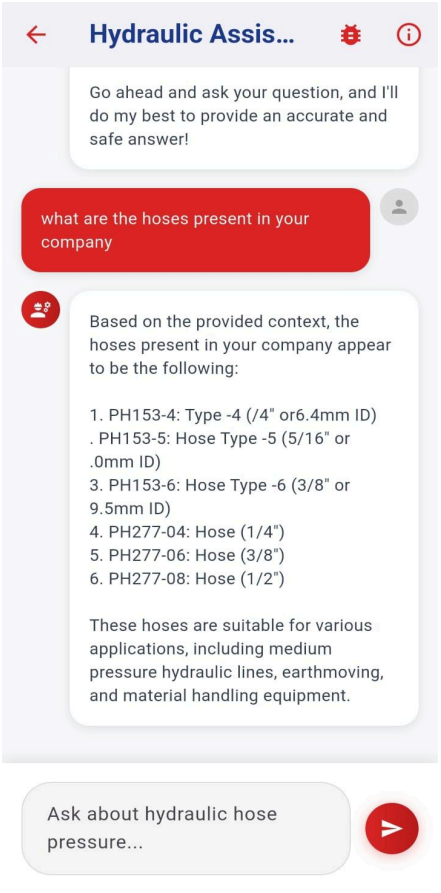
Hydraulic Assis...
Go ahead and ask your question, and I'll do my best to provide an accurate and safe answer!
what are the hoses present in your company
Based on the provided context, the hoses present in your company appear to be the following:
1. PH153-4: Type -4 (/4" or6.4mm ID)
. PH153-5: Hose Type -5 (5/16" or .0mm ID)
3. PH153-6: Hose Type -6 (3/8" or 9.5mm ID)
4. PH277-04: Hose (1/4")
5. PH277-06: Hose (3/8")
6. PH277-08: Hose (1/2")
These hoses are suitable for various applications, including medium pressure hydraulic lines, earthmoving, and material handling equipment.
Ask about hydraulic hose pressure...