

# RAG-Assisted Chatbot — Portfolio & Interview Assistant ■■

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**RAG-Assisted Chatbot** is an installable Python package that powers a portfolio-driven HR interview assistant. It uses GitHub README scraping, PDF conversion, vectorization (ChromaDB), and Retrieval-Augmented Generation (RAG) combined with an LLM to answer HR-style questions based on a candidate's resume and repositories.

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## ■ Highlights

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- Scrapes GitHub repositories' README files and saves them as well-styled PDFs.
- Builds a persistent Chroma vector store from PDF content using SentenceTransformers embeddings.
- Queries the vector DB to fetch top-k relevant text chunks for a question (RAG).
- Uses an LLM (e.g., `gpt-3.5-turbo` via `langchain-openai`) with structured output to produce interview-style responses.
- Packaged for easy reuse: `import Assistant, BuildVectorDB, AskToVectorDB, and GithubScrapper` from the package namespace. Example:

```
from rag_assisted_bot.rag_assisted_chatbot import Assistant, BuildVectorDB, AskToVectorDB, GithubScrapper
```

(When installed via pip the package name is `rag-assisted-chatbot`.)

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## ■ Quick overview

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This project provides three main capabilities:

- GitHub scraping: `GithubScrapper` fetches README content and converts to PDF (uses `xhtml2pdf`).
  - Vector DB builder: `BuildVectorDB` loads PDFs, splits text into chunks, encodes with `sentence-transformers`, and stores embeddings in ChromaDB.
  - Assistant: `Assistant` pairs an LLM with the RAG results to answer HR-style questions using an up-to-date resume context.
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## ■ Installation

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Clone and install locally:

```
git clone <repo_url>
cd <repo>
python -m pip install -e .
```

Or install dependencies from `requirements.txt`:

```
python -m pip install -r requirements.txt
```

Tip: Use a virtual environment (venv/conda).

## ■■ Configuration

Project configuration values are in `rag_assisted_bot/rag_assisted_chatbot/config.py`:

- `GITHUB_USERNAME` — username to scrape (default: "vijaytakbhat2002")
- `GITHUB_PDF_FOLDER` — folder to save generated PDFs (default: "rag\_assisted\_bot/scraped\_data/github\_pdfs")
- `METADATA_JSON_PATH` — metadata file location (default: "scraped\_metadata/metadata.json")
- `VECTORDB_PATH` — path for persistent ChromaDB storage (default: <project\_root>/vectordb)
- `COLLECTION_NAME` — Chroma collection name (default: "my\_embeddings")
- `EMBEDDING_MODEL_NAME` — embedding model (default: "all-MiniLM-L6-v2")
- `TOP_K_MATCHES` — number of RAG results to include (default: 3)
- `GPT_MODEL_NAME` — model used by the assistant (default: "gpt-3.5-mini")

Environment variables:

- `TOKEN_GITHUB` — **required** GitHub personal access token (the `GithubScrapper` will raise a `RuntimeError` if not set).

## ■ Quickstart Examples

### 1) Scrape READMEs and save PDFs

```
from rag_assisted_bot.rag_assisted_chatbot import GithubScrapper
import rag_assisted_bot.rag_assisted_chatbot.config as cfg

scraper = GithubScrapper(
    username=cfg.GITHUB_USERNAME,
    save_folder=cfg.GITHUB_PDF_FOLDER,
    metadata_save_folder=cfg.METADATA_JSON_PATH
)
scraper.scrap()
```

### 2) Build the persistent vector database

```
from rag_assisted_bot.rag_assisted_chatbot import BuildVectorDB
import rag_assisted_bot.rag_assisted_chatbot.config as cfg

builder = BuildVectorDB(
```

```

        directory_path=cfg.GITHUB_PDF_FOLDER,
        vectordb_path=cfg.VECTORDB_PATH,
        embedding_model_name=cfg.EMBEDDING_MODEL_NAME,
        collection_name=cfg.COLLECTION_NAME
    )
builder.build(chunk_size=300, chunk_overlap=100)

```

### 3) Run the assistant (interactive programmatic use)

```

from rag_assisted_bot.rag_assisted_chatbot import Assistant
import rag_assisted_bot.rag_assisted_chatbot.config as cfg

assistant = Assistant(
    gpt_model_name=cfg.GPT_MODEL_NAME,
    temperature=0.7,
    collection_name=cfg.COLLECTION_NAME,
    vectordb_path=cfg.VECTORDB_PATH,
    rag_activated=True
)
result = assistant.chat_with_model("Tell me about your key MLOps achievements")
print(result['question_category'])
print(result['response'].model_dump())

```

### 4) Query the Vector DB directly

```

from rag_assisted_bot.rag_assisted_chatbot.ask_vectordb import AskToVectorDB
import chromadb
import rag_assisted_bot.rag_assisted_chatbot.config as cfg

client = chromadb.PersistentClient(path=cfg.VECTORDB_PATH)
collection = client.get_collection(name=cfg.COLLECTION_NAME)
asker = AskToVectorDB(collection=collection, embedding_model_name=cfg.EMBEDDING_MODEL_NAME)
res = asker.ask("Explain your role in the Medical Insurance project", n_results=3)
print(res['documents'][0])

```

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## ■ How it works (architecture)

1. GithubScrapper fetches repository README files via GitHub API and saves them as PDFs.
2. BuildVectorDB loads PDFs with PyMuPDF, splits long texts into chunks using RecursiveCharacterTextSplitter, and encodes chunks with SentenceTransformer.
3. Embeddings are stored in a persistent ChromaDB collection (my\_embeddings).
4. AskToVectorDB embeds queries and queries ChromaDB for top-k chunks.
5. Assistant obtains a category for the question, fetches RAG context (top-k chunks), and calls an LLM with a SystemMessage + retrieved context to provide a structured InterviewResponse.

Structured LLM output uses pydantic models from `rag_assisted_bot/rag_assisted_chatbot/output_structure.py` (fields include `response_message`, `reference_links`, `confidence_score`, `follow_up_question`).

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## ■ Project structure

Key files and modules:

- `rag_assisted_bot/rag_assisted_chatbot/` — package modules
  - `github_scrapper.py` — GitHub README → PDF (method: `scrap()`)
  - `build_vectordb.py` — builds & persists ChromaDB embeddings (`BuildVectorDB`)
  - `ask_vectordb.py` — queries vector DB (`AskToVectorDB`)
  - `main.py` — Assistant class and RAG orchestration
  - `prompts.py, references.py` — prompts and static resume content
  - `output_structure.py` — pydantic models for structured outputs (`InterViewResponse, QuestionCategory`)
  - `config.py` — defaults you can edit (paths & model names)
  - Output folders created at runtime:
  - `rag_assisted_bot/scrapped_data/` — PDFs (default: `rag_assisted_bot/scrapped_data/github_pdfs`)
  - `scrapped_metadata/` — metadata JSON (default: `scrapped_metadata/metadata.json`)
  - `vectordb/` (default persistent ChromaDB storage path)
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## ■ Troubleshooting & tips

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- Missing GitHub token: `GithubScrapper` will raise `RuntimeError` at import time if `TOKEN_GITHUB` is not set in the environment.
  - If embeddings don't persist, ensure `VECTORDB_PATH` is writable and compatible with your `chromadb` version.
  - PDF loading requires `PyMuPDF` (package name `PyMuPDF`) and the `langchain_community.document_loaders.PyMuPDFLoader`.
  - Check `logs.log` in the project root for runtime logs.
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## ■ Contributing & License

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Contributions welcome — open an issue or PR with a clear description of the change. This project is licensed under **MIT**.

If you'd like, I can now: - Add a short `CONTRIBUTING.md` and an example GitHub Actions workflow for CI ■ - Add a `Makefile` / `scripts/ helpers` to run common flows (`scrape` → `build` → `query`) ■

If any of that sounds useful, tell me which you'd like next!