# Gen Al Engineering: Building RAG & Multi-Agent Al Systems

Date & Time: 9th March, 2025 (2:30 PM to 5 PM IST)

Hi Mastermind learners,

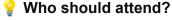
The world is shifting towards intelligent AI systems, in which AI agents can search, reason, and act on their own with specific domain knowledge. Let us take a step into understanding and building such an AI system.

In this **4-hour interactive session**, you'll gain insights into:

- Retrieval-Augmented Generation (RAG) and its applications in building smarter Al solutions
- Use **LLMs + FAISS** for fast, accurate data retrieval in RAG.
- Build multi-agent AI for various use cases in 2 different agentic AI framework
- Get hands-on experience with real-world datasets

#### **Key Takeaways:**

- Learn FAISS-powered retrieval for creating knowledge base for AI
- Build working system of Al Agents on multiple use cases
- Gain hands-on OpenAl / Groq + CrewAl / PhiData experience



Software Developers | Data Analysts | @ Al Enthusiasts | \_ Tech leaders

#### This session is designed for developers and engineers who:

X Are comfortable coding in Python and eager to build and deploy real-world Al solutions.

**Note** - you're not hands-on with Python yet, you might find the practical exercises challenging, but you'll still gain a solid understanding of the concepts and frameworks!

If you're excited about building the future with AI, this session is your next step.

# Agenda: What We'll Cover

- Retrieval-Augmented Generation (RAG) Enhancing Al with Knowledge Retrieval
  - Understand how RAG improves accuracy and relevance in Generative AI by integrating expert/domain knowledge.
  - Learn how **LLMs + FAISS** enable efficient, context-aware content generation.
  - **Hands-on:** Build a RAG-based system to extract insights from reference documents and enhance them using LLMs.

#### Agentic Al for Real-World Applications

- Explore the evolution of AI towards **autonomous decision-making** with multi-agent systems.
- Learn how AI agents solve **industry-specific tasks** by leveraging specialized tools and knowledge.
- Discover the key **technologies and frameworks** that power agentic Al systems.

#### Building Multi-Agent Systems with Crew Al & PhiData

- Design & implement multi-agent AI solutions for use cases like financial advisory, interactive learning, and data analytics.
- Build an Al-powered financial assistant that analyzes real-world stock data to generate recommendations.
- Develop a RAG-enabled agentic Al system to create an interactive learning platform.
- Learn how agentic AI can process structured information to derive actionable insights.

# A bit about the Mentors

- 1. Ramanathan With over two decades of rich experience in Data Science and Machine Learning, Ramanathan has established himself as a trusted mentor and leader in the industry. He has a proven track record of delivering transformative solutions for global clients, leveraging his expertise in statistical modeling, predictive analytics, and advanced AI/ML techniques. He is actively exploring Agentic AI frameworks to shape the future of intelligent systems.
- 2. Vishnuvardhan B K M A seasoned engineering software professional with over 2 decades of industrial experience spanning software development, certification, technical leadership, and program management. Extensive expertise in the aerospace and automotive industries, specializing in safety-critical systems. Adept at software architecture, design, and process definition, I am passionate about exploring and adopting emerging technologies. Currently a technical consultant, driving innovative solutions in software architecture and projects to develop solutions based on generative AI.

# Prerequisites & Setup – Complete Before the **Session begins!**

**Get Ready for the Session!** Watch this **4-minute setup guide** to prepare your environment before we go hands-on.

**Watch Now:** Setup Your Environment

Make sure you're all set before the session so you can dive straight into building AI agents! 🔥



### #1 Google Colab Setup

To ensure a smooth hands-on experience, we'll be using Google Colab—a free, browser-based platform to run Python code, including machine learning workflows.

#### Why Google Colab?

- No installations—run Python directly in your browser.
- Free access to GPUs/TPUs for accelerated computing.
- Work saved on Google Drive, accessible anytime.

#### How to Get Started

- Open: Google Colab <a href="https://colab.research.google.com/">https://colab.research.google.com/</a>
- Sign in with your Google Account (or create one).
- Once logged in you can,
  - 1. Open existing notebooks
  - 2. create a new notebook
  - 3. Import from Github or Google Drive
- Try creating simple "Hello World! script: print("Hello, Workshop Participants!")
  Press Shift + Enter to run it.

#### **Tips: For using Google Collab**

- Save your work regularly in Google Drive.
- To enable GPU/TPU: Go to Runtime > Change runtime type.
- Install libraries with !pip install library name>.

# #2 Groq Setup

#### Obtain a GROQ API Key - For Agentic hands on session

To fully participate in masterclass, you'll also need a GROQ API Key to access the tools and workflows seamlessly. Here's how you can get it:

#### **Steps to Get Your GROQ API Key**

- Visit the <a href="https://console.grog.com/">https://console.grog.com/</a> or your organization's GROQ portal.
- Log in with your registered email and password. (New user? Click Sign Up and follow the prompts.)

- Go to API Key Settings under Settings or Account.
- Click Generate API Key, name it (e.g., "Workshop Key"), and set permissions if required.
- Copy the key immediately and save it securely—it's displayed only once!

#### **Test Your API Key (Optional)**

Use this Python snippet in Colab to verify:

#### **Keep Your Key Secure**



Treat it like a password—don't share or expose it in code repositories.

#### Steps to store it in Google Colab

- Visit your Google Colab page (<a href="https://colab.research.google.com/">https://colab.research.google.com/</a>)
- After logging in, you will see 'secret' tab (key icon).
- Store the Groq API key with a name "GROQ\_API\_KEY" in a specific secret. Refer the video guide.

Note: Groq Free API keys have limitations in terms of tokens - you might face some difficulty while trying the hands on. Your Open AI API key (paid ones) will be very handy, if you have one.

## #3 Hugging Face Setup

Hugging face is a platform that is provided with multiple pre-trained models that help in deep learning, Gen AI etc (<a href="https://huggingface.co/">https://huggingface.co/</a>). We would be using some of the models from this platform in our Agentic AI hands on session. An API key for each user is required in this regard.

#### Steps to Get Your HF API Key

- Visit the <a href="https://huggingface.co/">https://huggingface.co/</a> and signup with your details (first time users).
  - This would require your basic details (mail id etc)
- Visit your user setting Access token (<a href="https://huggingface.co/settings/tokens">https://huggingface.co/settings/tokens</a>).
- Create a new token (with 'read' permission). Copy the token key and preserve it for your use. Remember this is personal and keep it safe.

#### Steps to store it in Google Colab

- Visit your Google Colab page (<a href="https://colab.research.google.com/">https://colab.research.google.com/</a>)
- After logging in, you will see 'secret' tab (key icon).
- Store the hugging face API key / token with a name "HF\_TOKEN" in a specific secret. Refer the video guide.