



AIML HACKATHON

Master Resource

Straight, No-Nonsense, Practical Guide

Ye woh exact roadmap hai jisse hackathon-winning projects bante hain.
Aise hi random YouTube playlists se nahi hota, ye execution-heavy hai.

SECTION 1

BASICS THAT MOST PEOPLE IGNORE

AIML ke andar ghusne se pehle ye chaar cheezein clear honi chahiye:

Python Foundations

- Data structures
- OOP basics
- APIs kaise call hote hain
- File handling

⚠️ Ye superficial mat rakhna. Hackathon projects Python pe hi run hote hain.

Maths Required

Koi IIT entrance-level nahi... bas itna:

- Linear algebra (vectors, matrices)
- Probability basics
- Loss functions kya hota hai

✅ Itna ho gaya to 70% logon se aage ho.

SECTION 2

THE REAL STUFF THAT WINS HACKATHONS

Ye woh tech stack hai jo abhi EVERY winning project mein common tha.

A. Generative AI

- **Prompt engineering** (Jina log underestimate karte hain, umma hi important hai)
- LLM APIs:
 - OpenAI
 - Gemini
 - Meta Llama (local inference)

B. Retrieval-Augmented Generation (RAG)

🔍 Hackathon winners literally RAG projects ke upar hi dance kar rahe the.

What to Learn:

Concept	Priority
Embeddings	🔴 High
Chunking strategies	🔴 High
Context size optimization	🟡 Medium
Query transformation	🟡 Medium
Hybrid search (BM25 + Vector)	🟢 Advanced

Tools:

- **LangChain** — industry standard
- **LlamaIndex** — easier for quick prototypes
- **FastAPI** — API layer banana padega

Vector Databases:

- Pinecone
- Chroma
- Weaviate
- Milvus

SECTION 3

FINE-TUNING

When to Fine-Tune:

✅ Domain-specific intent detection chahiye

✅ Instruction-following behaviour improve karna ho

✅ Model ko custom workflows sikhane ho

What You Actually Need:

- LoRA adapters
- QLoRA
- TRL (transformers + RLHF style training)
- Datasets formatting (JSONL)

❌ Fine-tuning blindly karne wale log fail hote hain.

✅ Fine-tuning ko optimize karne wale log first prize le jaate.

SECTION 4

MULTI-MODAL SYSTEMS

Bonus: Judges ko impress karne ka hack

Agar project text + image/audio/video combine kare...

🏆 Judges ki aankhein automatically chamakti hain.

Tools:

Use Case	Tool
Speech to Text	Whisper
Vision Models	ViT, CLIP
Image Understanding	Grounding DINO + SAM

🌟 Ek multimodal system = instantly premium.

SECTION 5

PROJECTS TO BUILD

LEVEL 1 (2-3 Projects)

- ☐ Custom chatbot for PDFs
- ☐ AI form filler (structured extraction)
- ☐ Notes summarizer with citations

Objective: RAG basics + embeddings + vector search

LEVEL 2 (2 Projects)

- ☐ Domain-expert assistant (Finance/Law/Health)
- ☐ Email workflow automation (LLM + prompts + APIs)

Objective: Multistep reasoning + workflow design

LEVEL 3 (Hackathon Winners)

- ☐ Autonomous AI agent (end-to-end tasks)
- ☐ Multi-modal RAG with images + text
- ☐ Local LLM fine-tuned for a niche

Objective: This is where trophies come. 🏆

SECTION 6

PROJECT STRUCTURE THAT WINS

Judges ko gyaan nahi chahiye. Unhe **clarity, execution, aur impact** chahiye.

1. Problem Statement 2. Why Existing Tools Fail 3. Your Solution + Architecture 4. Tech Stack 5. Demo (clean and short) 6. Limitations – trust me, this impresses Judges 7. Future Scope

⚠️ 99% teams fail because they just "show the app" without showing thinking.

SECTION 7

LEARNING ORDER

1. Python 2. Git/GitHub 3. Basics of ML 4. LLM APIs 5. RAG 6. Vector DBs 7. Prompt Engineering 8. LangChain/LlamaIndex 9. Fine-tuning Fundamentals 10. Deployment (FastAPI + Render/Vercel) 11. Multi-modal Integration

🕒 Yahi order tere growth ko straight line bana dega.

SECTION 8

PRESENTATION TIPS

The Formula:

- ✅ Less complexity
- ✅ More clarity
- ✅ More visuals
- ✅ Small wins
- ✅ Real-world impact

💡 Pro Tip:

"Ye real data pe tested hai, aur ye metrics hain."

Metrics kill. 📉

SECTION 9

SUMMARY

Phase	Focus Area
Foundation	Python + Math basics
Core Skills	RAG, LLMs, Vector DBs
Advanced	Fine-tuning, Multi-modal
Execution	Clean demos, clear structure

Made for Hackathon Warriors 🦊

Keep learning, keep building, keep winning!