

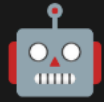


FOLLOWING THE SIGNAL: RANDOM WALK THROUGH ML/BIOINFORMATICS

Varun Shivashankar @ UofCalgary BioHack '25

ABOUT ME

- **Who:** Varun Shivashankar
- **Current Role:** Associate Director, ML @ Parabilis Medicines
- **Expertise:** Machine Learning, Computational Biology, Drug Discovery , and ChatGPT user 



I ASKED CHATGPT TO INTERVIEW ME

To prep for this talk, I asked ChatGPT to interview me!

Here are some key questions that guided this presentation:

1. Career Journey 🌱
2. Scientific Breakthroughs & "Firsts" 🏆 *What experiences significantly shaped your career trajectory?*
3. Tackling Real-World Challenges 🚧 *What major roadblocks taught you the most valuable lessons?*
4. Practical Advice for Future BioHackers 🎯



MY (HIGHLY NONLINEAR) JOURNEY

1. **Novartis (NIBR)** - Computational RNA biology, Network biology, built the MoA Central knowledge graph.
2. **Montai Therapeutics** - In silico modeling compound-target/pathway interactions and combinatorial effects.
3. **Orna Therapeutics** - AI-assisted circular RNA design; NGS-based screening.
4. **Parabilis Medicines (Now)** - AI-drive design of peptide binders with ML.



“If the science excites you, the cause is noble, and you believe you can add value—**dive head-first!**”

★ BREAKTHROUGHS (MANY FIRSTS!)

FIRST BIOINFORMATICS PRODUCT: MOA CENTRAL (NOVARTIS)

Built a knowledge graph search engine using PageRank to triage compound-target relationships.



"Frames target prioritization as a search problem—and algorithms can truly power discovery."

★ BREAKTHROUGHS (MANY FIRSTS!)

FIRST EMPLOYEE AT A STARTUP: MONTAI HEALTH

First full-time hire—helped shape an AI-driven drug discovery platform.

😂 *"Ironically, naming the company was our toughest challenge—we tried ranked-choice voting, but the CEO ultimately made an executive call."*

★ BREAKTHROUGHS (MANY FIRSTS!)

FIRST AI-DRIVEN SCREEN: ORNA THERAPEUTICS

Created an AI-powered circular RNA screening platform combining RNA-Language Models, structural RNA design, and large-scale NGS screening.





"We ended up ordering a suspicious amount of food, always justified by 'brainstorming' sessions!"



CHALLENGES & LESSONS LEARNED



Challenge  Transitioning from Bioinformatics → ML

Lesson Learned   **ML transforms your thinking:** Predictive models shifted how I fundamentally approach scientific problems.



CHALLENGES & LESSONS LEARNED



Challenge  Convincing teams to trust ML

Lesson Learned   **Communication is critical:** Frame everything in biological terms, and show clear, incremental value.





CHALLENGES & LESSONS LEARNED

Challenge  Biology + ML > ML alone

Lesson Learned   **Insights + models:** Pairing ML-generated sequences + RNA structural insights = best RNA designs at Orna.

CHALLENGES & LESSONS LEARNED

Challenge  Adopting software engineering early

Lesson Learned   Build lasting tools: Let your legacy live on after you!

CHALLENGES & LESSONS LEARNED

Challenge  Ensuring wet-lab accessibility

Lesson Learned   **Real impact = usability:** Making models and tools accessible to experimentalists to effect science.

(UNSOLICITED)ADVICE TO BIOHACKERS

Here's what I'd tell my younger self—and any aspiring BioHacker today:

1. Chase Problems, Not Techniques



Your favorite dataset will teach you the most.

2. Speak Biology First, ML Second



Learn how biologists think and communicate. Effective collaboration accelerates your impact.

3. Get Comfortable with Uncertainty



The most rewarding science happens at the intersection of uncertainty and exploration.

4. Adopt Software Best Practices Early



Clean code, good documentation, and thoughtful engineering amplify your impact and longevity.



META MOMENT: CHATGPT INTERVIEWER

- *What was it like being interviewed by ChatGPT?*
 - **Insightful** – Forced me to reflect deeply and clarify my thoughts.
 - **Surprising** – The AI occasionally asked better questions than human interviewers!
 - **Fun** – Who knew you could build slides through a conversation?