### **Generative AI for Personalized Drug Discovery**

📌 **Research Question:** Can **Graph Neural Networks (GNNs) + Diffusion Models** accelerate the discovery of novel drug compounds?  
📌 **Methodology:**

* Train a **GraphDiffusion Model** to **generate molecular structures**.
* Use **Transformer-based docking models (MolBERT, ChemBERTa)** for drug-likeness prediction.  
  📌 **Dataset:** ZINC, ChEMBL, PubChem.  
  📌 **Evaluation:** QED (Drug-likeness score), Docking efficiency, Bioactivity prediction.

✅ Impact: Accelerates **AI-driven drug discovery** and pharmaceutical innovation.

1. **AI-Powered Language Learning Chatbot**

📌 **Research Question:** Can an AI chatbot **help users learn a new language** through dynamic, conversational interactions?  
📌 **Methodology:**

* Train **GPT-4 / LLaMA-3 on multilingual datasets**.
* Implement **adaptive difficulty (AI adjusts responses based on user level)**.
* Integrate **speech-to-text models (Whisper, DeepSpeech) for pronunciation feedback**.  
  📌 **Dataset:** Duolingo dataset, OpenSubtitles (multilingual conversations).  
  📌 **Evaluation:** Improvement in user language proficiency (pre/post testing).  
  ✅ *Impact:* AI-powered **language tutor for personalized learning**.

### **AI for Interior Design & 3D Room Layout Generation**

📌 **Research Question:** Can AI generate **realistic interior design concepts** based on user preferences?  
📌 **Methodology:**

* Fine-tune **Stable Diffusion XL / ControlNet for room design layouts**.
* Use **GANs (InteriorGAN) to transform existing rooms**.
* Implement **3D depth estimation (MiDaS) for realistic room modeling**.  
  📌 **Dataset:** IKEA interior dataset, OpenRooms, ADE20K.  
  📌 **Evaluation:** Aesthetic score, User preference testing.  
  ✅ Impact: AI-powered **home & office interior design automation**.