Statement of Purpose

SURP 2025 Project Application

Project Name: Next-Gen Drug Discovery: Generative and Reinforcement Learning for Designing Anticancer Molecules

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I am excited to apply for the project titled *"Next-Gen Drug Discovery: Generative and Reinforcement Learning for Designing Anticancer Molecules"*. The idea of combining generative AI, reinforcement learning, and biomedical innovation grabbed my attention as it reflects my core interests in applying machine learning to impactful interdisciplinary challenges.

Being a part of the **Perception sub-system in IIT Bombay Racing's Driverless Team**, I've worked extensively on AI/ML applications like object detection, image segmentation, and real-time perception systems. Additionally, during the **Inter IIT Tech Meet 13.0 Swarm Robotics problem statement**, I developed a decentralised perception module for multi-agent systems. These experiences built a strong foundation in handling complex ML workflows, real-time data pipelines, and collaborative problem-solving.

Beyond team projects, I've pursued AI/ML independently through initiatives like **Seasons of Code (SOC)** and **Winter in Data Science (WiDS)**, where I implemented models ranging from CNNs to Transformer architectures from scratch, giving me a solid understanding of generative models and reinforcement learning concepts. More recently, I've explored Large Language Models (LLMs) and their adaptation in different domains, which has broadened my interest in generative AI.

This project's focus on integrating molecular embeddings, deep learning, and reinforcement learning for drug discovery feels like a natural extension of my AI/ML journey. I'm particularly drawn to the opportunity of working with cheminformatics tools and developing AI pipelines for molecular generation and optimization, contributing to real-world biomedical applications.

I believe my technical background in AI/ML, combined with hands-on experience in perception systems, object detection, and deep learning models, makes me a good fit for

this project. I'm eager to learn new concepts in drug discovery, molecular modeling, and cheminformatics, and I look forward to contributing meaningfully to this interdisciplinary research.