Docket #: S24-486

Screen-GPT Agent: Automating Knowledge-based Candidate Selection for Functional Screening

Stanford researchers have developed Screen-GPT, an AI-powered multi-agent platform that automates CRISPR genetic screening by integrating diverse biological data to design libraries and prioritize targets through transparent, explainable, and scalable workflows.

CRISPR functional genetic screens are powerful tools for mapping gene function, understanding disease, and identifying potential drug targets. However, current workflows are slow and fragmented. Moreover, designing libraries requires manual effort, target prioritization is inconsistent, and integrating genetic, transcriptomic, and clinical datasets is beyond most existing tools, leading to delays and poor reproducibility.

To address this issue, Stanford researchers have developed Screen-GPT, the first multi-agent, large language model (LLM)-driven platform designed to automate and optimize the workflow of functional genetic screens. It automates the entire process of integrating diverse multi-modal datasets, designing optimized sgRNA libraries and ranking hits with explainable AI, to identify relevant genetic targets for CRISPR screens. The system employs specialized agents that handle literature mining, data synthesis, and decision-making to deliver transparent, biological results. Screen-GPT has been validated on over 300+ curated screens and consistently outperforms both general-purpose AI and specialized CRISPR tools in accuracy and relevance.

Stage of Development:

Prototype

Applications

- CRISPR library design for labs
- Target prioritization for drug discovery
- Automated pipelines for CROs
- Custom screens for therapeutic research

Advantages

- Speeds workflows from weeks to hours
- Integrates multi-modal data
- Transparent, explainable results
- Proven superior performance
- Scalable and flexible

Publications

- Qu, Y., Huang, K., Yin, M. et al. CRISPR-GPT for agentic automation of gene-editing experiments. Nat. Biomed. Eng (2025). https://doi.org/10.1038/s41551-025-01463-z

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