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AI-driven device driver generator

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We present a web-based application that significantly simplifies and accelerates the development of Tango Controls device servers by integrating large language models (LLMs) into the code generation process. The tool allows users to define device attributes, commands, and properties through an intuitive graphical interface, and optionally upload device documentation in PDF format. Using retrieval-augmented generation, the system extracts relevant content from the documentation and generates Python code for Tango device servers, tailored to the specific device functionality. The backend leverages FastAPI and LangChain to interface with various LLMs such as GPT, Claude, and Gemini. Tests on devices like power supplies and teslameters show that the generated code often requires limited manual adjustments. While the application improves development efficiency and accuracy, it also highlights certain limitations, including occasional command mismatches and the need for better retrieval strategies. Future enhancements include automated test code generation, improved document parsing, support for additional programming languages, and integration of open-source models for broader applicability.

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Footnotes

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