

## Towards a Prompt Engineering Framework for Generative AI in Assistive Device Design

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The use of artificial intelligence (AI) into assistive device design represents a paradigm shift in engineering, enabling more efficient, user-centred solutions. This study investigates the use of prompt engineering to optimise generative AI-driven workflows for assistive devices, with an emphasis on the creation of a systematic framework that bridges big language models, such as ChatGPT, to CAD platforms like Fusion 360. This study aims to improve the translation of user-centric requirements into CAD-ready generative models in order to build an iterative process that increases assistive technology usability, manufacturability, and accessibility.

As a case study, the PREMIERTOGO project serves as a practical implementation of Generative Design (GD) within the field of prosthetics. This initiative employs AI-enhanced methodologies, including generative design and 3D printing, to develop an above-knee modular prosthesis that balances functionality, aesthetics, and adaptability. Furthermore, PREMIERTOGO integrates an AI-based Human-Machine Interface (HMI) and sensor technologies to optimise real-time control, health monitoring, and personalised adjustments for amputees.

By looking at PREMIERTOGO through the lens of prompt engineering for GD, this study will highlight important problems and potential for expediting AI-assisted workflows for assistive devices. The proposed approach aims to improve the efficiency of generative design in CAD systems while simultaneously laying the groundwork for future advances in adaptive, user-centred assistive technology. This method emphasises AI's revolutionary significance in the development of next-generation assistive technologies.