# Review of "Generating Requirements Documents for Embedded Systems: A Device Knowledge-Guided Approach"

**1. Main Technical Contributions**

This article proposes a framework based on device knowledge guidance for automatically generating requirement documents for embedded systems. This framework introduces a hierarchical requirements model consisting of four levels, including intent, system requirements, equipment requirements, and software requirements. By utilizing the device knowledge base, this framework simplifies the process of requirement acquisition and document generation. The specific methods include using templates to collect stakeholder opinions, supplementing information with device knowledge, and creating environmental models to identify gaps in requirements. In addition, the framework proposes a system approach for deriving software requirements from system requirements through state machines. Its important contribution lies in combining automation methods with human-computer interaction, greatly reducing the time and workload required to generate high-quality requirement documents.

**2. Possible Applications**

This method has wide applicability in the demanding field of embedded system development. For example, in the aerospace field, this framework can simplify the process of creating satellite control system requirements, as shown in the case study of the solar search system in this article. Similarly, in the medical field, this framework can help meet the needs of developing medical devices such as patient monitoring systems. Other applications include industrial automation, robotics, and Internet of Things (IoT) systems, which require precise capture of complex interactions between hardware and software components. Due to the integration of device knowledge, this framework is particularly useful in projects involving legacy systems, allowing for better reuse of existing components and faster adaptation to constantly changing requirements.

**3. Possible Future Extensions**

Future research can enhance the device knowledge base by utilizing machine learning and natural language processing technologies, thereby expanding the framework's support for more devices and application areas. As suggested by the author, developing a prototype tool can make the framework more easily accepted by industry practitioners. The integrated real-time collaboration function can promote the participation of multiple stakeholders, thereby improving the quality of requirements. In addition, extending this method to support standards outside of IEEE, such as ISO or DO-178C, can enhance its application in highly regulated industries. Another direction worth exploring is the integration of advanced artificial intelligence technology to automatically suggest optimal configurations or detect inconsistencies in requirements.

**4. Choice of Paper and Personal Interest**

I chose this paper because it is related to the field of embedded software engineering and has practical significance for simplifying the requirements engineering process. Writing requirement documents is often a time-consuming and error prone task, especially in embedded system development where hardware and software integration is crucial. This article expands my understanding of how to reduce these challenges through structured frameworks and automation tools. The method of using device knowledge to guide requirement acquisition and hierarchical requirement modeling in this article is highly consistent with my interest in improving the software development process through automation and model-based methods.

**5. Review Details**

- **Reviewer:** Xukang Wang
- **Date:** November 5, 2024
- **Citation:** C. Wang, J. Zhao, X. Chen, and Z. Jin, "Generating Requirements Documents for Embedded Systems: A Device Knowledge-Guided Approach," 2024 IEEE 32nd International Requirements Engineering Conference Workshops (REW), Reykjavik, Iceland, 2024, pp. 200–205, doi: 10.1109/REW61692.2024.00032.