Smart Schematic: An Interactive Web-Based Tool for Electronics Manufacturing, Inspection and Diagnostics

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Abstract

Smart Schematic is a lightweight web-based tool that transforms static KiCad schematics into an interactive environment linking components to BOM data, datasheets, and inspection-relevant metadata. The system enables technicians and engineers to quickly navigate circuit designs and support troubleshooting directly from a browser. Future work includes integration with AOI and thermal imaging for human-AI collaborative inspection.

Introduction

Electronics manufacturing relies heavily on schematics, yet they are typically static and difficult to use on the production floor. Smart Schematic bridges this gap by providing an interactive environment that reduces cognitive load and improves access to design data.

Background

Traditional ECAD tools are not designed for manufacturing environments. Static PDFs require manual cross-referencing between schematics, BOMs and datasheets.

System Overview

The tool converts KiCad exports into an interactive web interface linking schematic graphics with BOM metadata.

Architecture

Python processes BOM data and JavaScript renders the interactive schematic in a browser.

Key Features

Clickable components, BOM integration, datasheet linking and DNP visualization.

Use Cases

Visual inspection, flying probe testing, failure analysis and training.

Future Work

Integration with AOI, thermal imaging and human■AI collaborative diagnostics.

Conclusion

Smart Schematic improves accessibility of design data and supports intelligent manufacturing workflows.