CADY

Case Study

CADY's AI-powered technology demonstrated remarkable effectiveness in identifying and flagging six critical errors within a schematic design

Introduction

In early 2023, we were approached by babyark, who needed a technological solution inspect their main board before moving forward to the next stage. The company heard of CADY's automatic electrical inspection solution and approached us to use the system. This case study will present CADY's analysis and inspection results on babyark's main board.

Inspection Report Overview

CADY’s report contains a variety of findings, ranging from wrong input voltages to connection instruction violations. The system's comprehension of datasheet information leads to an accuracy rate of 80% (currently, on average and rising) of its findings. With each finding the user may mark the finding as “Need to Fix” or “Skip”. The “Skip” option is used to ignore the alert due to an intentional design consideration or due to insignificance. The rest (20%) are false positive notifications (not design errors) that may easily be classified by the user, as the system provides information regarding its specific origin in the datasheet that led the issuance of that specific alert

In over 65% of the inspected boards, at least one of the findings is marked as “Need to Fix”, meaning that the finding is accurate and significant.

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Let's dive deeper into three out of the six critical errors detected by CADY:

Stabilizing Capacitor Value

The system detected the voltage regulator, LP5907-1P2DBV, in both the Netlist and BOM files uploaded by the designer, and successfully matched it to the corresponding entry in CADY's database. Through the system's NLP algorithm, which analyzed the component's datasheet, it was inferred that pins 1 (IN) and 5 (OUT) should be connected to stabilizing capacitors. **The recommended value for the IN's capacitor was 1-µF, and for OUT's capacitor was minimum 1-uF.**

Consequently, the system scanned through the Netlist and discovered that these pins were indeed connected to stabilizing capacitors. However, it identified a discrepancy: **the capacitors' values were lower than the recommended values according to the datasheet**. Thus, the system issued an alert regarding the mismatch. In the following inspection of the design we saw that the board designer replaced the capacitors to meet the required values.

Missing Pull-up Resistor

The system detected another component, an I/O expander TCA9534ADWR, in both the Netlist and BOM, and successfully matched it to the corresponding entry in CADY's database. Through the system's NLP algorithm, which analyzed the component's datasheet, it was inferred that pin 13 (INT#) should be connected to a pull-up resistor (pin's description: "Interrupt output. Connect to VCC through a pull-up resistor").

Then, the system scanned through the Netlist and discovered that this pin was not connected to a pull-up resistor. Therefore, the system issued an alert regarding the mismatch, and in the following inspection, the designer added a pull-up resistor.

Operating Ambient Temperature Range Mismatch

CADY's system utilizes the datasheet of each component to detect the operating ambient temperature range. In this case, the system successfully identified the operating temperature range of one of this board's precision timers, NE555PW, as stated in its datasheet. The identified range for NE555PW was 0°C to 70°C.

Then, the system cross-referenced the ambient temperature range selected by the user for this specific design (-40°C to 85°C) with each component in the design. The analysis discovered and alerted that NE555PW is not designed to operate below 0°C nor above 70°C.

Consequently, the designer marked the finding as “need to fix”, and replaced the component.

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About CADY

CADY uses AI technology to perform automatic inspection and verification of electrical schematics - enabling clients to improve and expedite the design process, save money & resources, reduce time to market and contribute to the quality, reliability, and safety of the final product. CADY's system realizes requirements and properties of the components in the schematic from their corresponding datasheets and checks them against the schematic wiring connections to detect errors.

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