

Real-Time Component Identification on Printed Circuit Boards

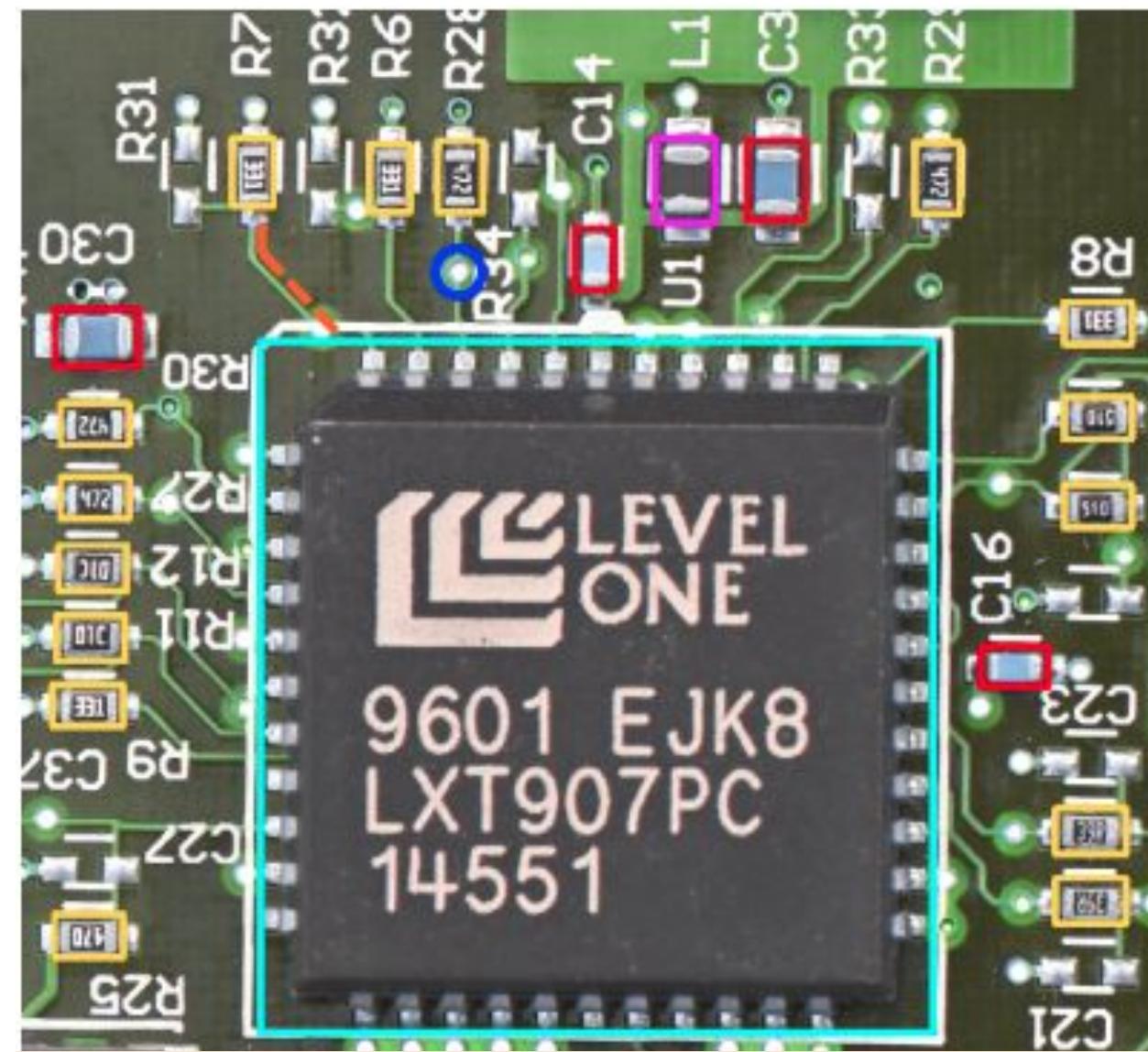
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Motivation: Component ID for PCB Recycling

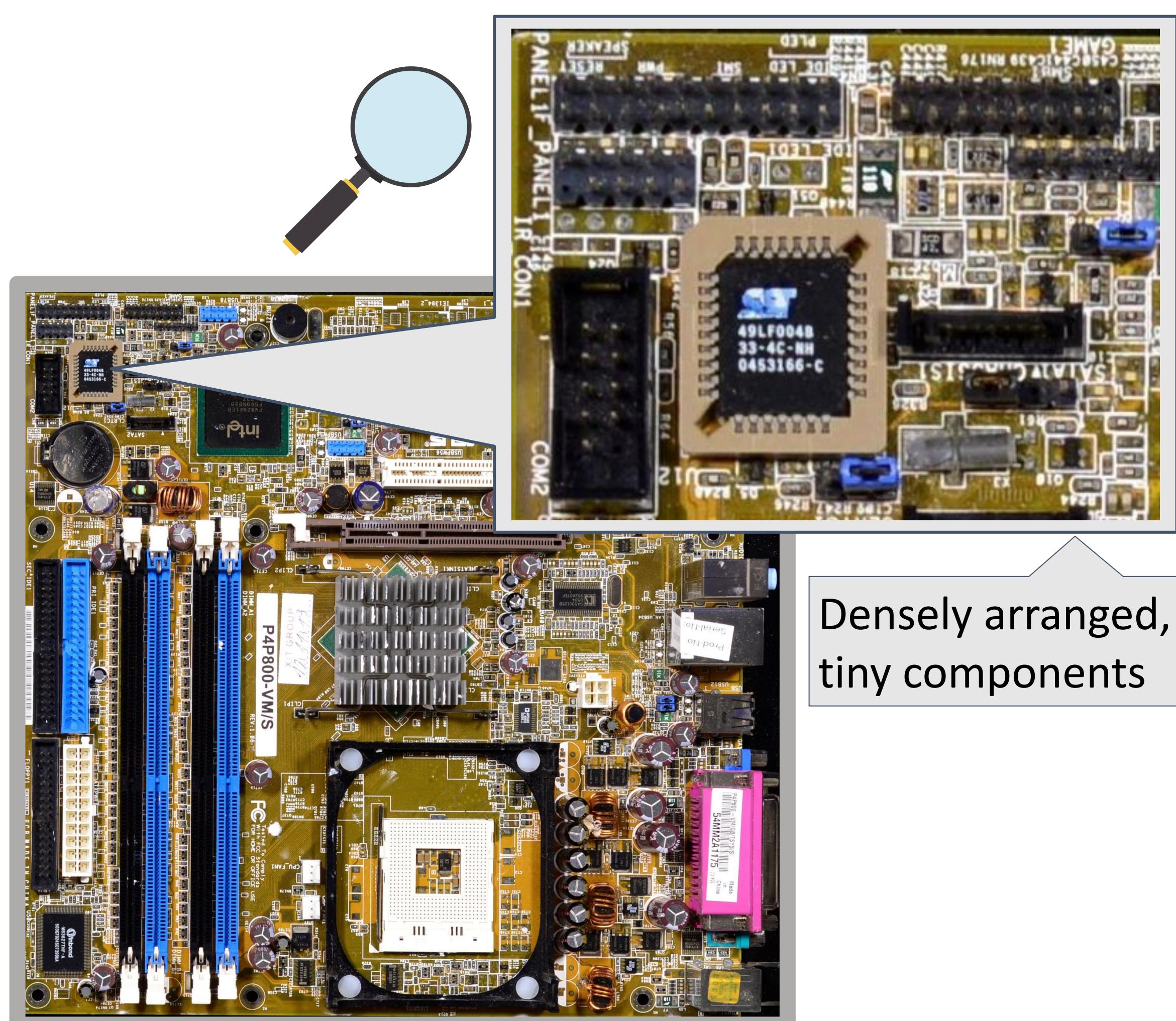
Waste PCBs have reusable components - can be extracted if identified



Resistors: 15 || Capacitors: 4 ||
Inductors: 1 || ICs: 1

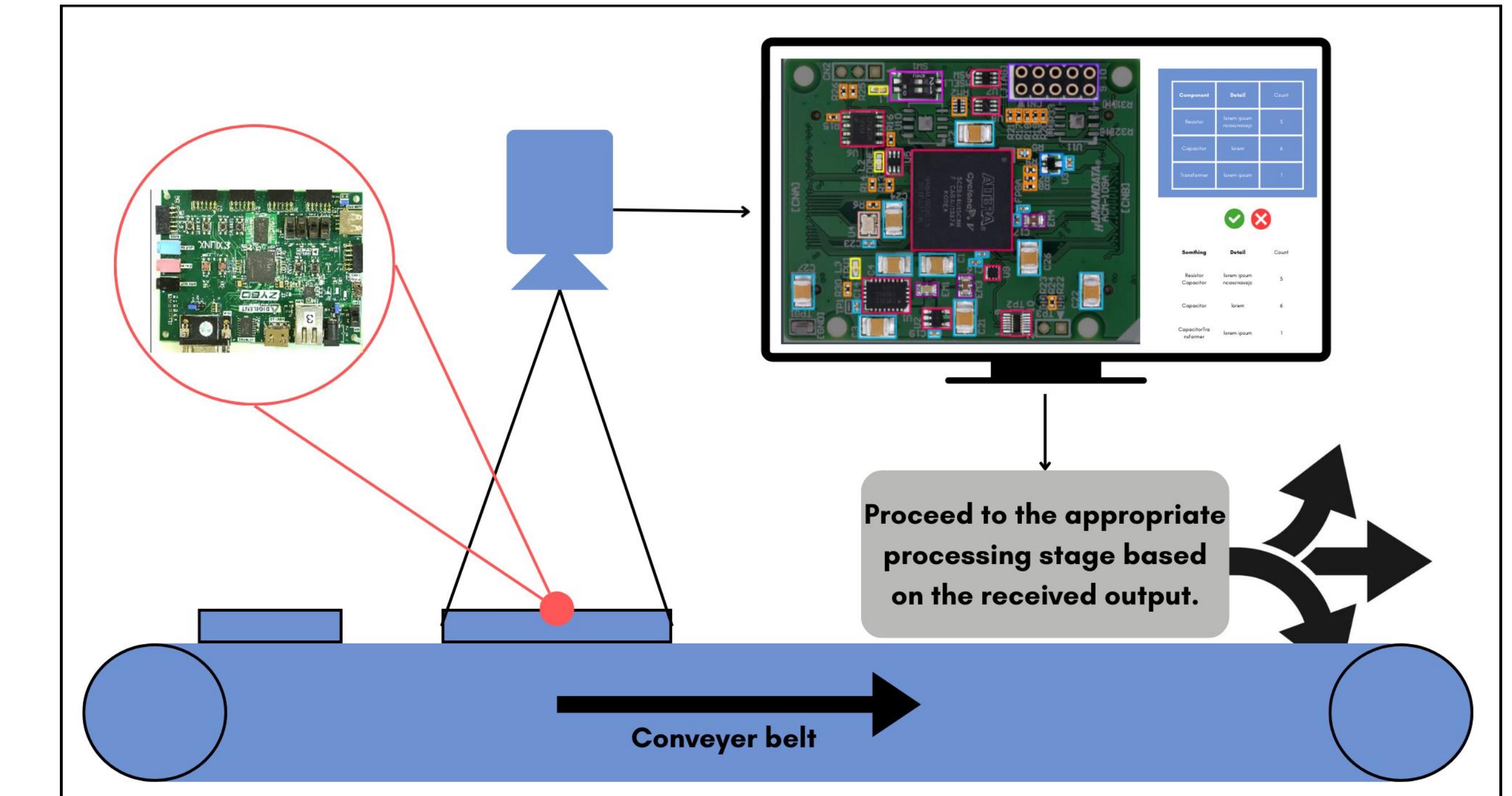
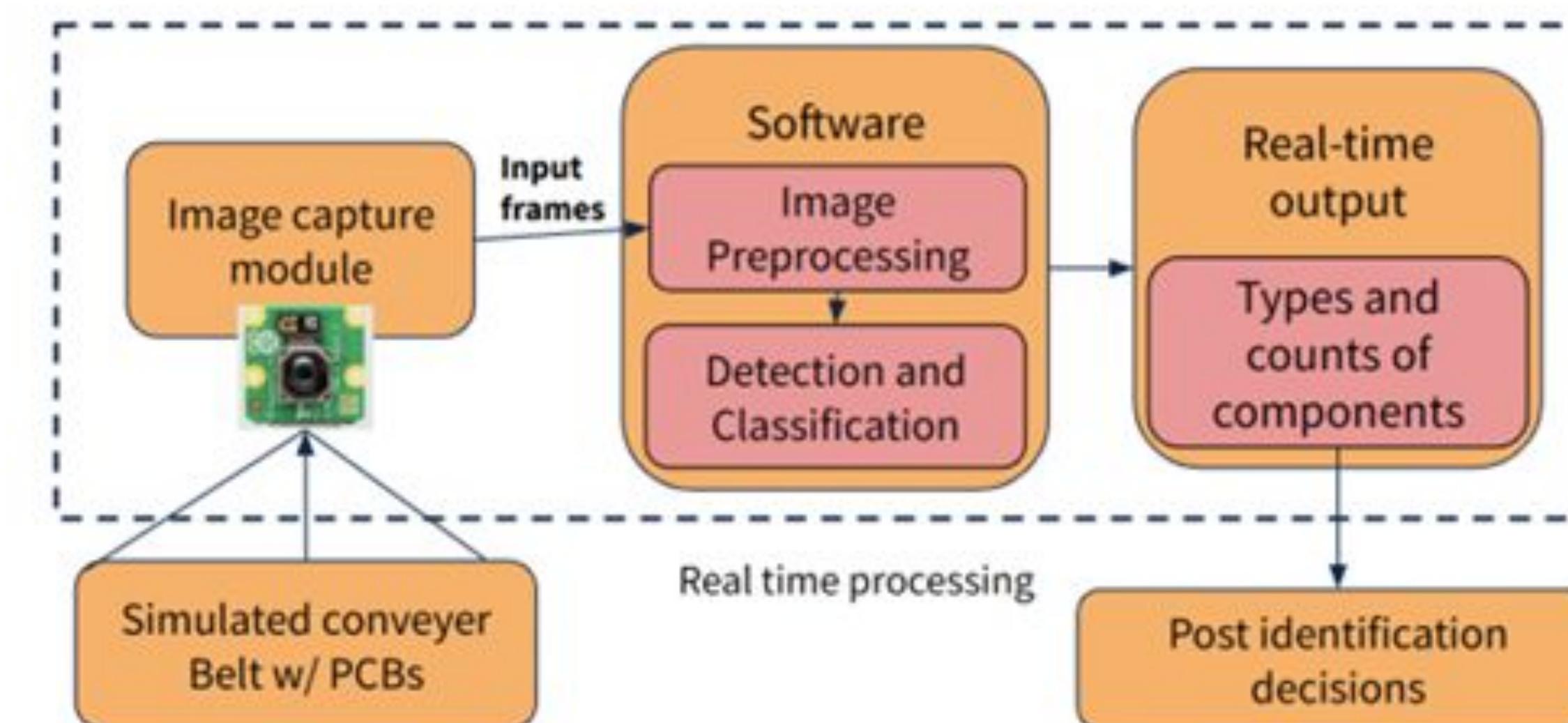
Challenges

- (1) Very small components arranged **densely**
- (2) **Blurry** images of PCBs from conveyor belt
- (3) Fast and accurate detection

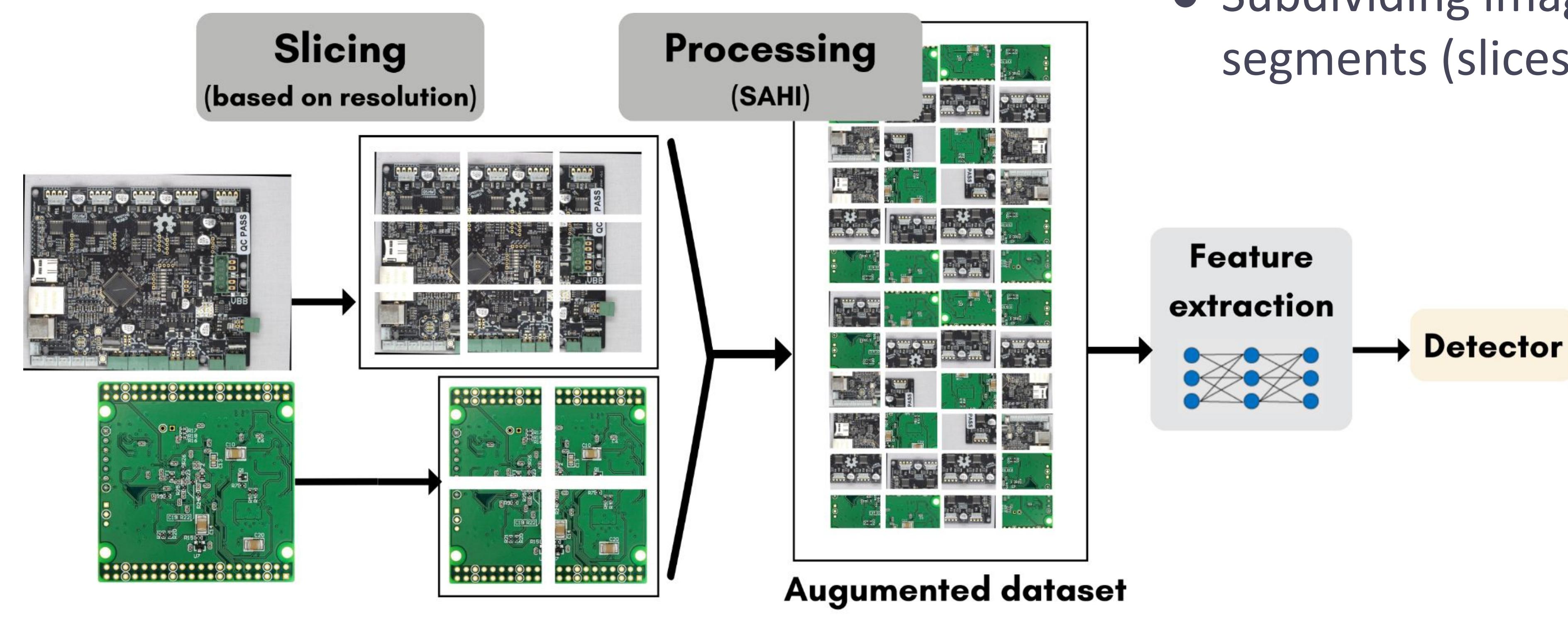


- State-of-the-art systems handle this challenge by using complex ML models with multiple stages – these are **high latency solutions**.
- Solution should not slow down throughput of the recycling plant.

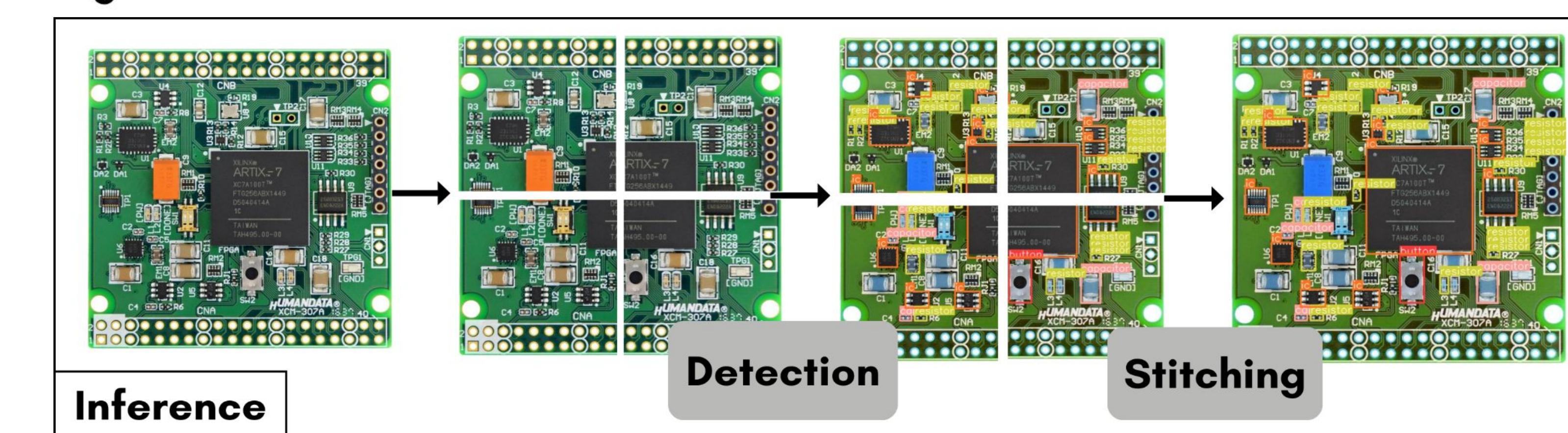
Proposed Solution



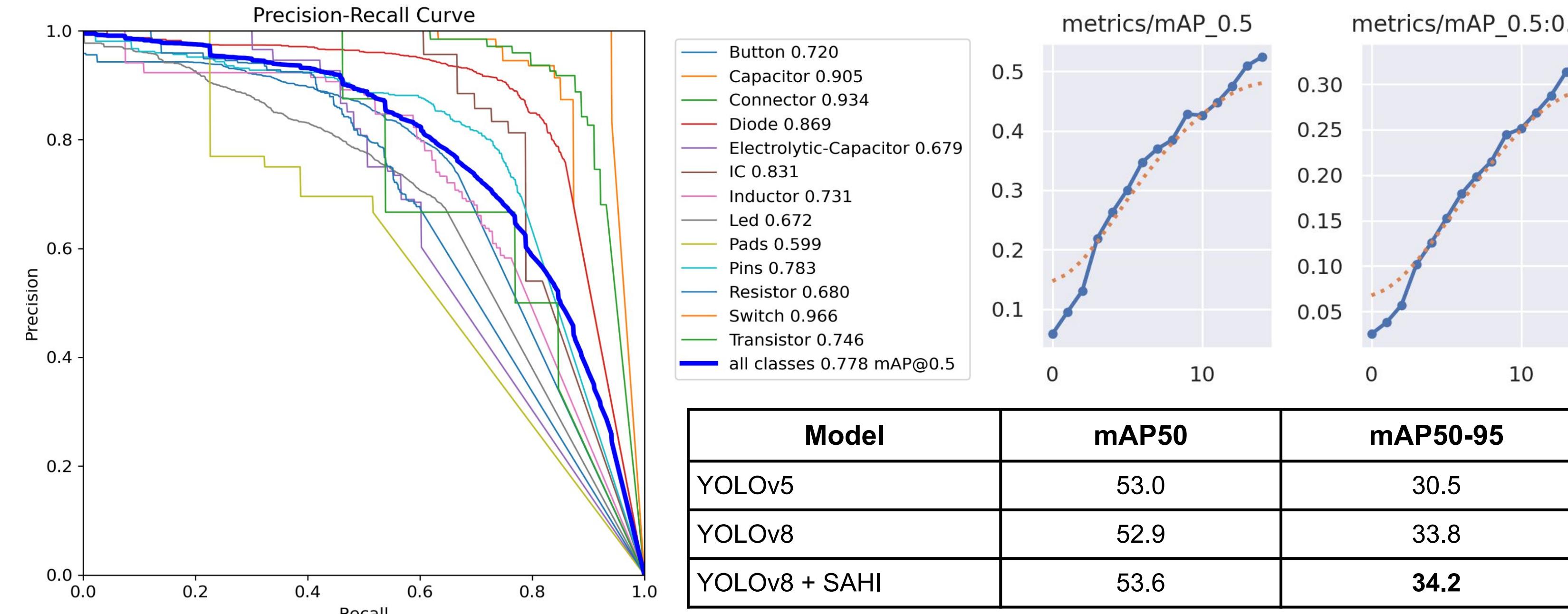
Approach: Segment and Detect



Using **Slicing Aided Hyper Inference (SAHI)** for small components detection on densely packed PCBs



Main Results



Utilizing YOLO + SAHI yielded good results, with high precision, robust recall, and a mean Average Precision score of 53.6%