Assignment: Generic quick vision assembly

Type: Internship
Discipline: Mechatronics, Electrical Engineering or Technical Computer Science
Level: Bachelor's degree - Internship

Assignment description

AME aims to develop a vision inspection system that is straightforward to configure for the visual inspection of assembled products. The intended workflow allows an operator to place a known-good product in the system and press the "Teach" button once to establish it as the reference for subsequent inspections.

The system must detect visible assembly defects, including missing screws or components, as well as defective display pixels.

The goal of this assignment is to develop a working prototype and demonstrate the feasibility of this workflow. You will investigate how image comparison, classical vision techniques and potentially AI can distinguish normal product variation from defects. For display inspection, you will investigate a separate test using suitable test patterns. You will determine the camera resolution, optics and lighting required to assess individual pixels reliably.

Result: A prototype with a teach button and a clear pass/fail indication, tested on representative assemblies and displays, with documented performance and application limits.

Your activities

You will combine the camera, lighting, product positioning and inspection software into a single setup. The assignment follows the V-model: define requirements and test criteria first, then design, implement and verify the solution.

- **Pre-study**
  - Investigate faulty AME products, examine visible defect types and display.
  - Define scope and primary use cases

- **Project definition**
  - Functional Specification containing all project & product requirements
  - Factory Acceptance Test (FAT) / validation plan and defining test criteria

- **Research and design**
  - Investigate what can be achieved using a single known-good reference product and which additional settings or reference images are required.
  - Select the required components and design a proof of concept.

- **Realization**
  - Prototyping the defined system (proof-of-concept)
  - Develop a test plan using good and faulty products independent of the teach images, with criteria for missed defects and false rejects.

- **Testing and handover**
  - Verification of the solution against requirements
  - Deliver the design, software, test results and operating instructions, including recommendations for extending the solution to other products.