TEK Bachelor's Project Proposal

Information about students

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Information about the project

Project's Title: Automated Product Label Scanning for Inventory Registration

Supervisor (SDU)

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Company Partner

1. Yes (Note: This is from the Itslearning project proposal.)

- Name: Buy2Sell ApS
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Project Description

This is a guide to what the project description should contain:

- **Context:** Companies such as Buy2Sell process, register, and resell new and used industrial electronic equipment. Before products can enter inventory, multiple structured fields must be registered, for example manufacturer, product type or model, item category, condition, and country of origin. Much of this information is already present on manufacturer product labels as printed text and barcodes, for example model or type, serial number, manufacturing details, and technical specifications.

- **Specific problem:** Staff currently transfer label information manually into an internal registration system. This is time-consuming and leads to avoidable errors and inconsistencies, which slows down the overall workflow.

- **Approach:** We propose a data-capture pipeline for product labels that captures a label image using a phone or camera, detects and reads printed text and barcodes, extracts relevant attributes, and maps them into the corresponding registration fields. Text recognition will be based on modern machine learning OCR systems and multimodal models that can extract text and support structured output, while barcode decoding will be handled as a deterministic step. The pipeline will include parsing, normalization, and validation of extracted fields, as well as confidence indicators and a review interface that allows employees to verify or correct uncertain results. The solution will be evaluated using real label images and data provided by the company, focusing on extraction accuracy and measured time saved per item.

- **Time perspective:**
  The project will be divided into incremental SDLC phases and represented in a 2-week sprint-based Gantt chart (project start 2026-02-03). Proposed phases include:
- Sprint 1 (Plan/Analyze): requirements clarification, field mapping to Buy2Sell's registration schema, evaluation criteria
- Sprint 2 (Design): architecture, data model, review UI flow, export format or API contract, validation rules
- Sprint 3 (Implement v1): image capture, baseline OCR and barcode decoding, initial parsing and attribute extraction
- Sprint 4 (Implement v2): preprocessing, label detection, normalization, confidence scoring
- Sprint 5 (Integrate): human in the loop review UI, validation, export or API integration
- Sprint 6 (Test/Evaluate): dataset expansion, test suite, evaluation harness for accuracy and time saved
- Sprint 7 (Hardening): edge cases, performance, error handling, UX polish
- Sprint 8 (Acceptance/Deploy): acceptance testing, packaging, release candidate, demo preparation, app freeze by 2026-05-31
- June (Report): final evaluation write-up, report submission, final demo and presentation preparation

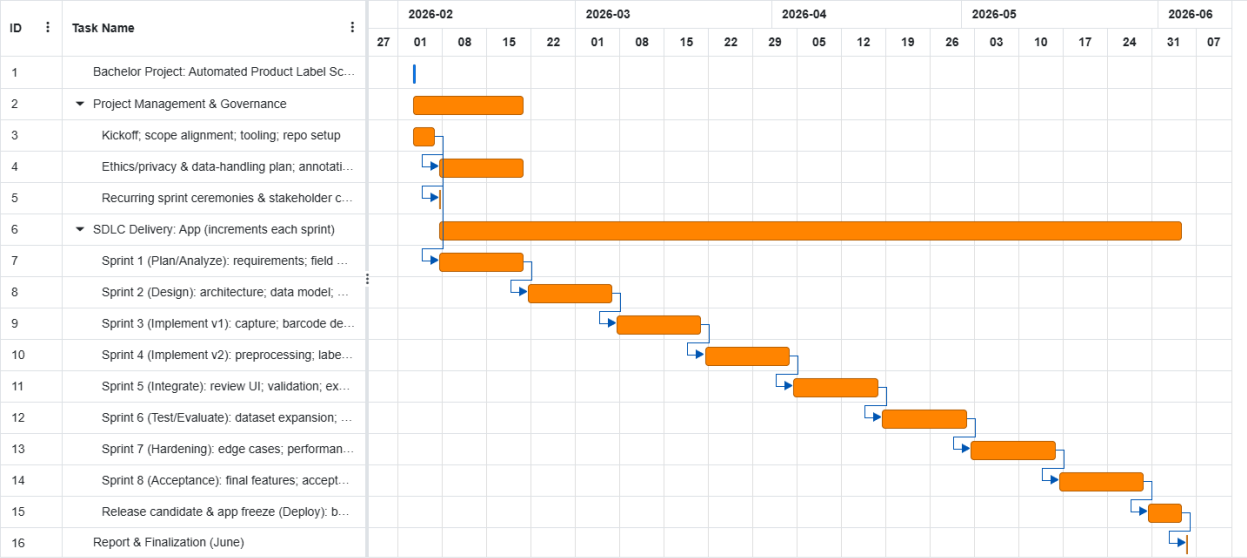

Figure 1. Gantt chart

- **Search literature:** We will survey practical and research-based approaches to text detection and recognition, as well as barcode decoding and robust field extraction. We will focus on real-world label challenges such as glare, blur, angled shots, small fonts, and varying layouts, and on engineering techniques for validation, confidence estimation, and human review. Findings will inform baseline tool selection, pipeline design decisions, and the evaluation methodology.

Problem Formulation

This is a guide to what a problem statement can contain:

- Problem

Industrial equipment registrars often enter key product information manually by reading manufacturer labels and typing the data into an internal system. This manual transfer is slow and leads to avoidable errors and inconsistencies.

- Context

Product labels typically contain many of the required registration fields, for example manufacturer, model or type, serial number, manufacturing details, and technical specifications. Labels often include barcodes. Employees must currently read information from the label and re-enter it into the registration interface.

- Relevance

Automating label-to-system data capture can reduce registration time per item, improve data quality, and make the workflow more consistent. This is a relevant software engineering problem involving computer vision, OCR, barcode decoding, and robust field extraction with validation and confidence estimates.

- Overall goal and sub-goals

Design and evaluate a solution that extracts structured product information from label images (text and barcodes) and outputs mapped registration fields with minimal manual input, supported by a reliable human verification step for uncertain cases.

- Establish requirements and a mapping between label information and the company registration schema, including formats and validation rules.
- Implement a pipeline to capture label images and perform preprocessing, OCR, and barcode decoding.
- Extract, normalize, and validate key fields (at minimum: manufacturer, model or type, serial number), including confidence scoring.
- Prototype an integration and review flow, for example structured export for import or an API contract plus a review interface.
- Evaluate performance on real label data: field-level accuracy, robustness to image conditions, and measured reduction in registration time per item.

References

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