SESSION 4:

PROPOSAL STRUCTURE & WRITING STYLE

Guidelines for MSE project

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Objective

Understand and apply the standard structure of a research proposal.

Assess the coherence and completeness of a research outline.

Identify and avoid common writing issues in research proposals.

Provide constructive feedback on peer proposals.

1. Introduction and Background

1.1 Problem Description

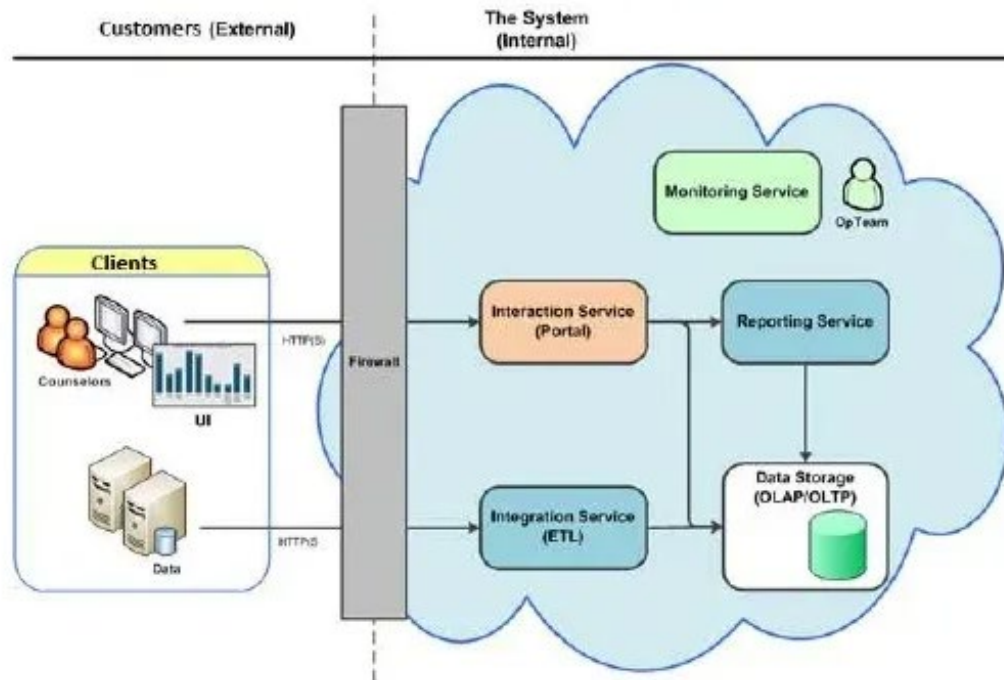- Clearly define the problem, context, and research gap.

1.2 Research Objectives:

- Set SMART goals and include specific research questions.

1.3 Scope:

- Clearly define boundaries to keep project focused.

2. Proposed Solution

2.1 Proposed Solution
◦ Describe the solution and justify why it fits.

2.2 Architecture Diagram
◦ Include system architecture to show component design.

2.3 Technology and Tools
◦ List chosen technologies and justify selection.

3. Implementation Plan

Divide the project into clear development stages

- **Phân tích yêu cầu**: Xác định rõ người dùng là ai, họ cần gì.
- **Thiết kế hệ thống**: Phác thảo giao diện, kiến trúc hệ thống.
- **Lập trình**: Thực hiện các chức năng chính.
- **Kiểm thử**: Đảm bảo hệ thống hoạt động đúng.
- **Triển khai**: Đưa sản phẩm đến người dùng thử nghiệm.

Create a timeline with key milestones

- Thời gian bắt đầu – kết thúc
- Mốc hoàn thành chính (milestone)
- Sản phẩm đầu ra dự kiến (deliverables)

Assess resources, risks, and technical feasibility

4. Expectation ➔ 5. Evaluation

4. Expected Results

- Nêu rõ kết quả đầu ra có thể đo lường: sản phẩm (vd. Mobile app, web app...), tính năng, mức độ hoàn thiện

5. Evaluation Plan

- Nêu phương pháp đánh giá: test, khảo sát, phân tích số liệu...
- Chỉ ra tiêu chí cụ thể: hiệu năng (performance), độ ổn định (stability), mức độ hài lòng người dùng (usability),

6. References

Cite credible sources using IEEE style.

- Tài liệu tham khảo giúp chứng minh tác giả đã nghiên cứu nền tảng học thuật hoặc kỹ thuật liên quan.
- Phần này cần:
  - Trích dẫn bài báo, sách, tài liệu chính thống.
  - Tuân theo chuẩn IEEE (dạng số: [1], [2], …).
  - Không chỉ liệt kê web chung chung (ví dụ "Wikipedia" hoặc "Google").

APPLYING IEEE REFERENCE STYLE

In-Text Citation

The Gemini model, developed by Google, represents a state-of-the-art vision-language model (VLM) with advanced capabilities in text and image understanding [3]. Its long context window and multimodal capability make it particularly useful for processing visually complex PDF data, where traditional extraction models struggle. By leveraging Gemini, it is possible to extract structured data from PDFs with greater accuracy and efficiency. However, the effective utilization of Gemini for VAT invoice data extraction requires careful prompt engineering and fine-tuning. The model's performance is highly dependent on the quality and specificity of the prompts used to guide the extraction process [4].

Prompt tuning involves optimizing the prompts provided to the model to elicit the desired information accurately and reliably. This process requires a deep understanding

IEEE Citation Style
- IEEE citation style employs bracketed numbers to reference sources within the text efficiently.

Placement of Citations
- Bracketed citation numbers are placed directly before punctuation marks for clarity and proper formatting.

References

Reference Examples:

[1] Klippa, "How to extract data from invoices: Manual, ocr & ai solutions," 2025, accessed on February 21, 2025. [Online]. Available: https://www.klippa.com/en/blog/information/invoice-data-extraction/

[2] P. Schmid, "From pdfs to insights: Structured outputs from pdfs with gemini 2.0," Google DeepMind, Tech. Rep., 2025. [Online]. Available: https://www.philschmid.de/gemini-pdf-to-data

[3] G. AI, "Gemini model overview," 2024, accessed on February 21, 2025. [Online]. Available: https://ai.google.dev/gemini-api/docs/overview

[4] A. Irani, "Automate pdf data extraction using gemini 1.5 flash and google apps script," *Medium*, 2024. [Online]. Available: https://medium.com/google-cloud/automate-pdf-data-extraction-using-gemini-1-5-flash-and-google-apps-script-48b10a6d722f

[5] D. Team, "Prompt engineering techniques for large language models," 2024, accessed on February 21, 2025. [Online]. Available: https://dev.to/engineering/prompt-engineering-techniques-for-large-language-models-3l3g

[6] P. G. Team, "Getting started with prompt engineering," 2024, accessed on February 21, 2025. [Online]. Available: https://www.promptingguide.ai/models/gemini

[7] D. S. Team, "Data storage solutions for financial applications," 2024, accessed on February 21, 2025. [Online]. Available: https://datasolutions.com/storage-solutions-financial-applications

[8] TaxJar, "How to automate tax compliance with ai-powered solutions," 2024, accessed on February 21, 2025. [Online]. Available: https://www.taxjar.com/blog/automate-tax-compliance-ai/
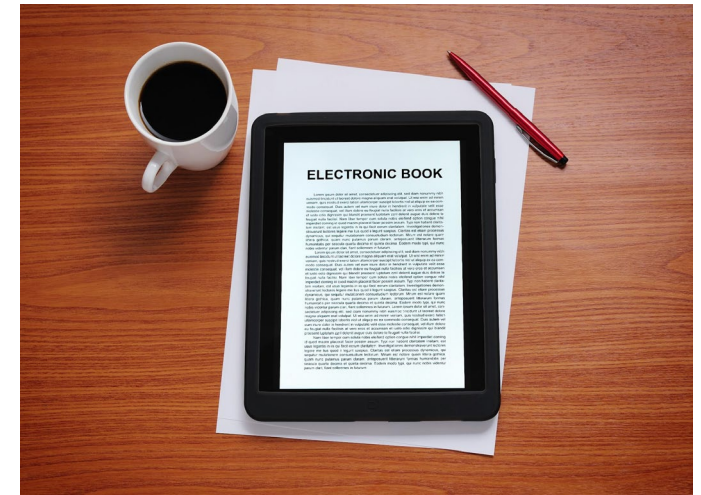
Example

[68] Microsoft, "Microsoft Bot Framework," [Online]. Available: https://dev.botframework.com/. Accessed: April 3, 2025.

[69] S. N. Phan, "Screenshot from Azure DevOps at Platihub, captured for academic purposes," unpublished, 2025.

[70] S. N. Phan, "Research methodology framework illustrated by the author," unpublished, 2025.

[71] S. N. Phan, "Data preprocessing pipeline illustrated by the author," unpublished, 2025.

[72] S. N. Phan, "Examples of augmented training queries generated by the author," unpublished, 2025.

[73] S. N. Phan, "Sample JSON training data created by the author," unpublished, 2025.

[74] S. N. Phan, "LoRA architecture illustrated by the author," unpublished, 2025.

COMMON FORMATTING ERRORS

Education, in its various forms, is one of the most fundamental drivers of societal progress. From early childhood education to professional development, the ability to acquire, process, and apply knowledge shapes individual success and collective advancement. Despite the centrality of education, modern pedagogical frameworks are often rooted in outdated models that fail to reflect the complexities of contemporary learning environments (Means et al., 2010).

Traditional classroom settings, for example, rely heavily on standardized teaching approaches that assume uniformity in learning pace and comprehension. This one-size-fits-all model, while convenient, neglects the diverse cognitive profiles of students, leading to disparities in educational outcomes. Some students may thrive under conventional instruction, while others require additional support, scaffolding, or alternative learning pathways to achieve similar levels of understanding (Shiffrin & Schneider, 1977).

Mixing Citation Styles: Avoid APA or Harvard in IEEE Theses

Avoid Mixing Citation Styles
- Mixing APA or Harvard with IEEE citations can confuse readers and reduce thesis professionalism.

Importance of Consistency
- Maintaining a single citation style ensures clarity and presents a polished academic work.

[10] W. Cheah *et al.*, "MIRRAX: A Reconfigurable Robot for Limited Access Environments," *IEEE Trans. Robot.*, vol. 39, no. 2, pp. 1341–1352, Apr. 2023, doi: 10.1109/TRO.2022.3207095.

[11] S. Macenski and I. Jambrecic, "SLAM Toolbox: SLAM for the dynamic world," *J. Open Source Softw.*, vol. 6, no. 61, p. 2783, May 2021, doi: 10.21105/joss.02783.

[12] F. M. Talaat and H. ZainEldin, "An improved fire detection approach based on YOLO-v8 for smart cities," *Neural Comput. Appl.*, vol. 35, no. 28, pp. 20939–20954, Oct. 2023, doi: 10.1007/s00521-023-08809-1.

[13] S. Chitram, S. Kumar, and S. Thenmalar, "Enhancing Fire and Smoke Detection Using Deep Learning Techniques," in *CC 2023*, MDPI, Mar. 2024, p. 7. doi: 10.3390/engproc2024062007.

[14] G. H. de A. Pereira, A. M. Fusioka, B. T. Nassu, and R. Minetto, "Active Fire Detection in Landsat-8 Imagery: a Large-Scale Dataset and a Deep-Learning Study," *ISPRS J. Photogramm. Remote Sens.*, vol. 178, pp. 171–186, Aug. 2021, doi:

Missing or Incomplete Citations

Complete Source Citation

- All reused content such as text, code, and figures should be properly credited to original authors.

Avoiding Plagiarism

- Proper citation helps maintain academic integrity and prevents plagiarism accusations.

Crediting Code Usage

- Reused or adapted code must be credited clearly to its original source to respect intellectual property.

FORMATTING TABLES

Chapter 4

SYSTEM DESIGN

This research introduces an advanced monitoring framework designed to automatically identify hazardous items, particularly weapons, in real-time. The integration of surveillance cameras with sophisticated AI models aims to quickly identify threats, initiate immediate alarms, and promptly inform system stakeholders, effectively minimizing potential risks.

Model	Precision (P)	Recall (R)	mAP@50	mAP@50-95
YOLOv5	0.680	0.376	0.394	0.254
YOLOv8	0.689	0.396	0.404	0.252
YOLOv11	0.661	0.392	0.419	0.276

Table 4.1 Comparison performance of YOLO models

Number Tables
Sequentially by Chapter

- Number tables sequentially throughout your thesis to help readers quickly locate and reference data.

Example: Sample Table with Proper Caption and Layout

Caption Placement

- Proper IEEE caption placement is above the table for correct reference and clarity.

Font Usage

- Using the recommended font style and size ensures consistent and professional table presentation.

Alignment and Numbering

- Proper alignment of columns and IEEE numbering format aids readability and organization.

TABLE I.　　TABLE STYLES

Table Head	Table Column Head		
	Table column subhead	Subhead	Subhead
copy	More table copy[a]		

a. Sample of a Table footnote. *(Table footnote)*

TABLE I: Number of Instances per Category

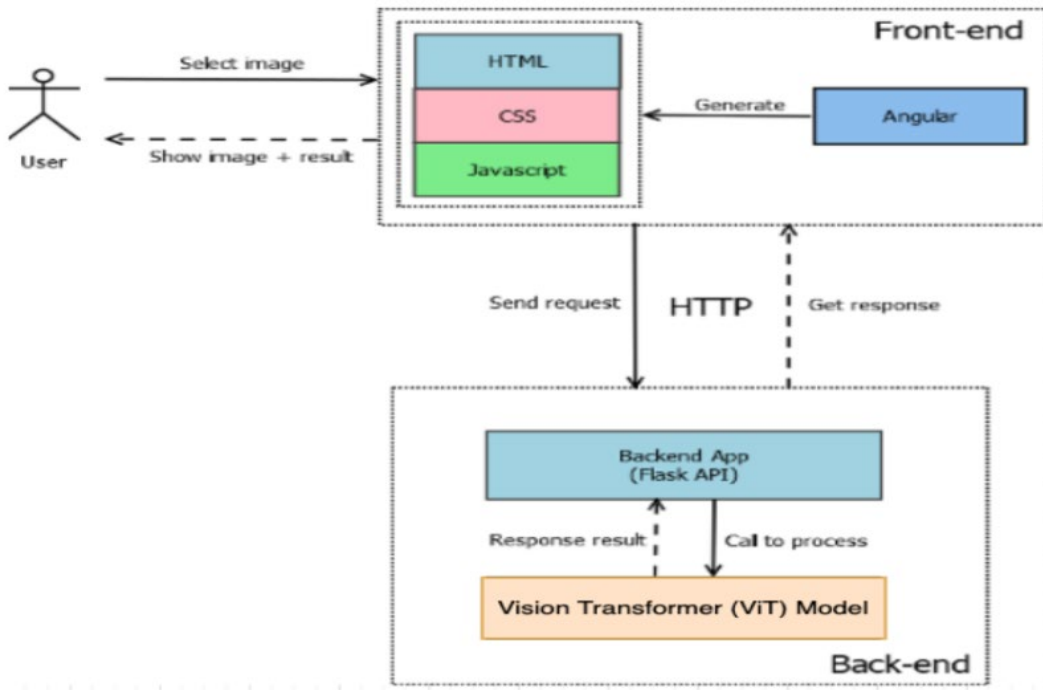| Class	Number of Instances	Percentage
Normal	97,278	19.7%
DoS	391,458	79.2%
Probe	4,107	0.83%
R2L	1,126	0.23%
U2R	52	0.01%

FIGURES AND DIAGRAMS

Figure 6: Web application architecture diagram

Any problem?

Image Quality: Use High-Resolution, Clearly Labeled Graphics

High-Resolution Images

Use high-resolution images to ensure clarity and detail in both print and digital formats.

Readable Labels and Annotations

Labels and annotations should be legible and properly sized for professionalism and easy understanding.

Include Source in Caption if Reused

Proper Figure Citation

- Always cite the original source when reusing figures to respect intellectual property rights.

Maintain Academic Integrity

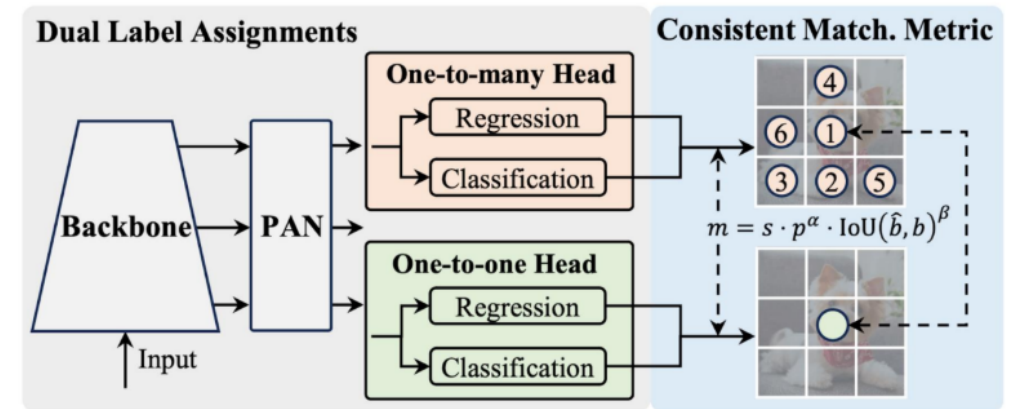- Including source in figure captions helps uphold honesty and trust in scholarly work.

Figure 7. Architecture of YOLOv10: Dual Label Assignment with Attention Mechanisms
(Source: Article "YoloV10 Paper Translation (Real-Time End-to-End Object Detection)" by PAXING Programmer on CSDN, August 5, 2024)

Any problem?

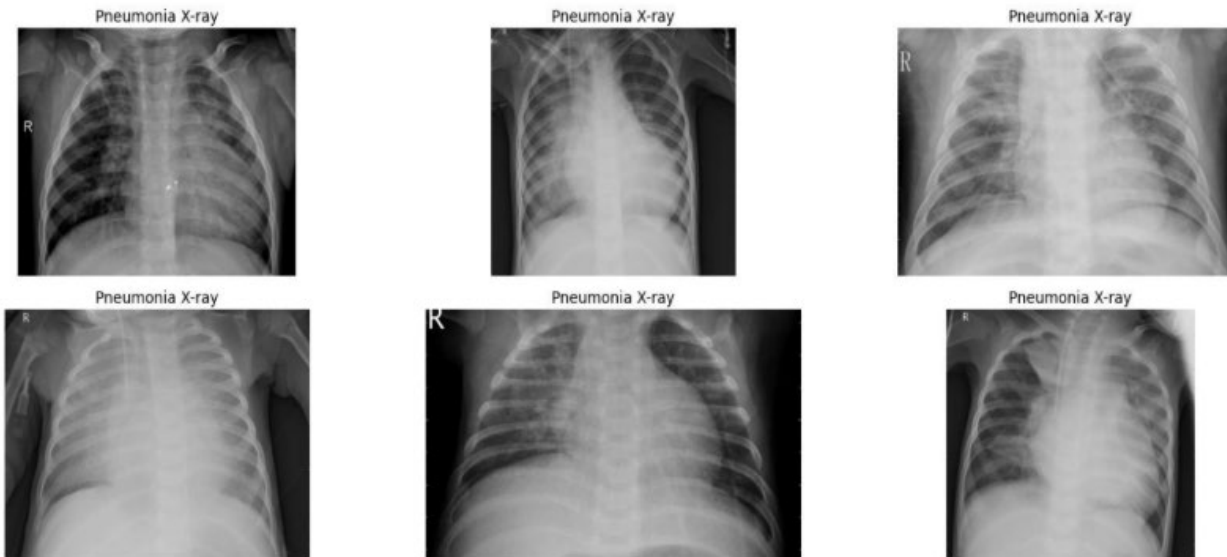# Sample Figure with IEEE-Style Caption and Reference

Figure 2: The largest TB Chest X-ray Database [10]

IEEE Caption Format

- Figures should use IEEE-style captions that clearly and concisely describe the visual content in academic documents.

Proper Reference Citation

- References must be placed directly below the figure to accurately and professionally credit the original sources.

FORMATTING AND CITING CODE BLOCKS

Monospaced Font and Layout

Use Monospaced Font

- Choose a monospaced font like Courier New so each character has equal width. This makes code easier to read and review.

Consistent Indentation

- Always use proper and consistent indentation. It keeps your code organized and helps others understand and debug it efficiently.

```sql
CREATE OR REPLACE FUNCTION transaction_embedding()
RETURNS TRIGGER AS $$
DECLARE
    response RECORD;
    transaction_detail_data JSONB;
BEGIN
    -- Retrieve the full transaction details in JSON format.
    SELECT data INTO transaction_detail_data FROM
public.get_transaction_detail_json_data(NEW.transaction_id);

    -- If data was found, send it to the n8n webhook.
    IF transaction_detail_data IS NOT NULL THEN
        SELECT status, content::jsonb INTO response
        FROM http_post(
```

Placement: Short Code in Main Text, Long Code in Appendix

Short Code in Main Text

- Short code snippets enhance clarity when embedded directly in the main text for easier understanding.

Long Code in Appendix

- Longer code blocks are placed in the appendix to maintain focus and avoid disrupting the narrative flow.

Appendix

No.	Name	Page
1	Appendix 1: Database Schema Description	64
2	Appendix 2: Technical Documentation for PostgreSQL Functions and Triggers	70
3	Appendix 3: Technical Documentation for n8n Automation Workflows	78

Inline Vs. Block Code

APPENDICES

Appendix A: Implementation Details

- **AbstractBasePage Overview**: To apply Page Object Model design pattern [12], we use AbstractBasePage class as a foundation class for all page objects of our automation framework. This abstract class contains all functionalities used for interacting with web elements and web pages. The following are key components of this class:
  - **Page Information Retrieval**: methods to retrieve the name of the web application and the web page our framework is interacting with.

```
/**
 * Retrieves the name of the package containing the page class.
 */
public String getWebName() {
    return this.getClass().getPackage().getName().split("\\.")[1];
}

/**
 * Retrieves the name of the page class.
 */
public String getPageName() {
```

Inline Code Usage

- Use inline code for short snippets within a sentence to highlight code without breaking the flow. e.g. print("Hello World")

Block Code Formatting

- Use block code for longer code segments. This separates the code from the main text, making it easier to read and understand.

COMMON FORMATTING ERRORS

Table Position and Alignment

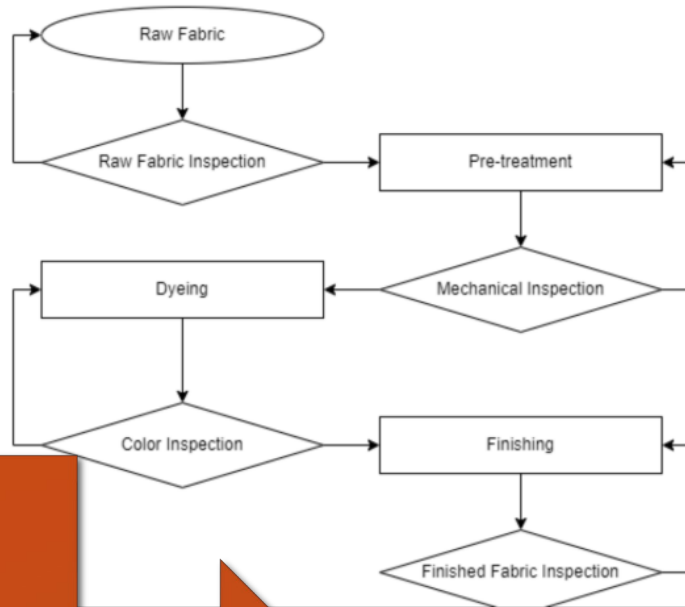Below is a comparison table of the featured YOLO versions:

Version	Outstanding improvements	Accuracy	Speed (FPS)
YOLOv4	CSPDarknet53, Mosaic Augmentation	High	Fast
YOLOv5	Compact optimization, easy to deploy	Medium	Very fast
YOLOv7	Efficient Layer Aggregation Networks (ELAN)	Very high	Fast
YOLOv10	Attention Mechanisms, Transformer Integration	Maximum	Very fast

Page break between rows (orphan)

- **Placement after first mention**
  - Tables must be positioned immediately after their first mention to support reader comprehension and flow.

- **Center alignment**
  - Center-align tables on the page for a clean and professional appearance in the thesis layout.

In particular, upgrades that introduce the Attention Mechanisms, AFAM and CBAM, have significantly improved the detection capability of small and blurry defects on the fabric surface [6][3].

Figure 3. Textile Production Process in Dyeing Factory.

Moreover, such focused datasets in the current research have dramatically improved model effectiveness, allowing for optimization in both cost and time of deployment. By incorporating major enhancement techniques such as Attention Mechanisms and multi-level information synthesis, fine-tuned YOLOv10 has shown amazing processing speed and accuracy levels reaching up to 25-30 frames per second—reflecting real-time inspection requirements on production lines.

Page break between figure and caption

Caption Placement: Below the Figure, in Sentence Case

- Caption Placement
  - Captions should be placed directly below figures to ensure clarity and consistency in publications.

- Use of Sentence Case
  - Captions should be written in sentence case to maintain a professional and readable appearance.

Caption Formatting

TABLE III. DETECTION PERFORMANCE

Train Dataset $\mathcal{D}^{train}$	Test Datset $\mathcal{D}^{test}$	Models	Performance Measures	Categories						
				Alcohol	Insulting Gesture	Blood	Cigarette	Gun	Knife	All
$\mathcal{D}^{train}_{normal}$	$\mathcal{D}^{test}_{normal}$	YOLOv5	mAP@50	97.4	97.8	69.8	89.2	91.6	95.0	90.1
			mAP@50-95	89.7	85.1	48.6	79.9	75.1	80.5	76.5
		Faster R-CNN	mAP@50	89.3	99.3	73.6	83.5	90.0	87.7	87.2
			mAP@50-95	72.3	76.9	39.9	60.5	62.5	62.2	62.4
	$\mathcal{D}^{test}_{hard}$	YOLOv5	mAP@50	55.2	66.7	44.7	41.2	61.5	49.7	53.2
			mAP@50-95	40.2	47.9	27.7	26.2	43.3	39.4	37.4
		Faster R-CNN	mAP@50	39.0	55.2	20.1	10.7	33.9	38.0	32.8
			mAP@50-95	24.5	38.5	9.4	4.8	22.0	19.3	19.8
$\mathcal{D}^{train}_{normal} \cup \mathcal{D}^{train}_{hard}$	$\mathcal{D}^{test}_{normal}$	YOLOv5	mAP@50	99.2	99.5	79.1	95.5	98.4	95.1	94.5
			mAP@50-95	92.8	87.4	58.4	80.2	86.9	83.2	81.5
		Faster R-CNN	mAP@50	96.1	100.0	66.0	85.0	94.3	89.7	88.5
			mAP@50-95	79.5	74.9	39.1	62.2	64.5	61.7	63.6
	$\mathcal{D}^{test}_{hard}$	YOLOv5	mAP@50	91.9	75.5	70.2	88.2	76.2	74.9	79.5
			mAP50-95	75.7	57.3	46.8	63.1	59.5	55.4	59.6
		Faster R-CNN	mAP@50	83.1	64.7	57.4	78.2	64.9	52.8	66.9
			mAP@50-95	57.9	41.4	28.7	45.8	36.6	31.9	40.4

Fig. 3.1 Detection Performance Trained Models

This is a table, not a figure!

Uppercase Table Captions
◦ IEEE style mandates *table captions be in uppercase* to ensure clarity and uniformity in presentation.

TABLE with Roman Numerals
◦ TABLE I
◦ TABLE II

Caption Placement Above Table
◦ *Captions are placed above tables* to guide readers before viewing data.

Concise and Descriptive Titles
◦ *Captions should be concise yet descriptive* to effectively inform the reader about the table's content.

Fig. 3.2 Comparison of NLP Techniques: Prompt Engineering, RAG, and Fine-tuning

Incorrect Labels and Numbering: Check Table/Figure/Citation Consistency

Sequential Labeling

Tables, figures, and citations must be numbered in the order they appear to maintain clarity and accuracy.

Consistent Labeling Format

Use a uniform format for labeling all tables, figures, and citations to avoid reader confusion.

Prevent Misreferencing

Proper labeling prevents misreferencing and ensures accurate citation in academic and professional writing.

The exported dataset was then securely stored and systematically managed, either on cloud platforms or secure local storage devices, ensuring data security and easy access when needed.

Benefits of Using Roboflow for Labeling

Increased Efficiency and Accuracy

Roboflow enhances efficiency and annotation accuracy through powerful tools and an intuitive user interface, saving researchers time and effort.

Better Data Management and Organization

Roboflow offers effective data management tools, allowing users to track project progress, review annotations, and make necessary adjustments.

Seamless Integration with AI Models

Roboflow supports exporting data in multiple formats, optimizing training and model deployment for machine learning and computer vision applications.

Community Support

Roboflow has a large and active user community where researchers can share experiences, seek guidance, and receive support when facing challenges in annotation and dataset
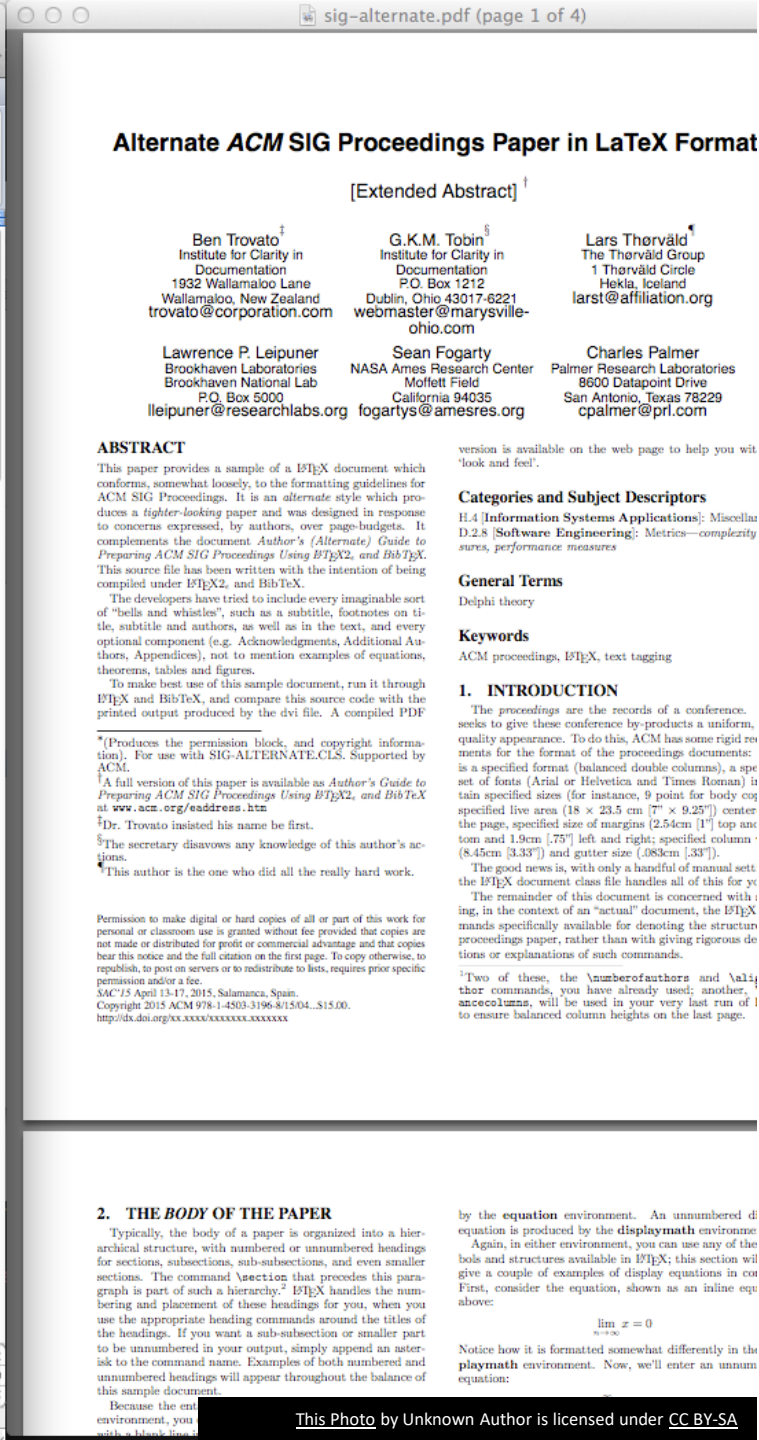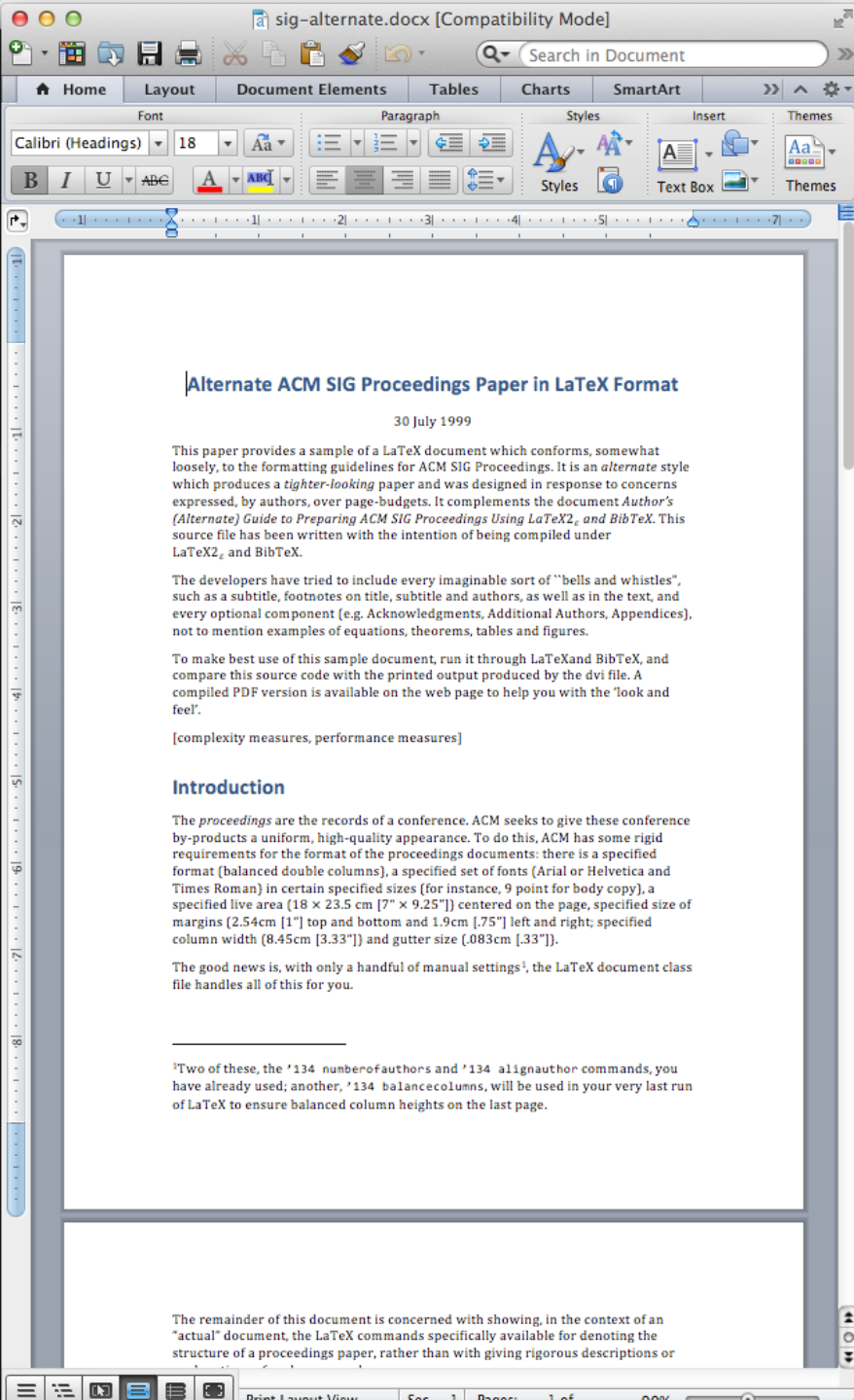

Writing style

- Write full sentence / paragraph

- Limit use of bullet point

PRACTICAL TOOLS AND TIPS FOR IEEE FORMATTING

LaTeX and Word IEEE Templates: Benefits and Usage Tips

Ensures Formatting Compliance

Official IEEE templates guarantee adherence to required formatting standards and guidelines.

Simplifies Document Preparation

Templates reduce time and effort by providing ready-made formatting for authors.

Reference Managers: Using Zotero, Mendeley for Consistent Citations

Organizing Research Sources

Zotero and Mendeley help users to efficiently organize and manage research sources in one place.

Automatic Citation Formatting

These tools automatically format citations and bibliographies in IEEE style, saving time and ensuring consistency.