

Degree Programme

Systems Engineering

Major Infotronics

# Bachelor's Thesis

## Diploma 2025

Firstname Lastname

### Thesis Template

Longer Subtitle

Professor

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Submission date

14 August 2025





# Thesis Template

Graduate

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## Objective

The objective of this thesis is to analyze and improve the performance of a predictive maintenance system in industrial IoT environments by implementing advanced data processing algorithms and evaluating their effectiveness through case studies.

## Bachelor's Thesis

| 2025 |

Degree Programme  
*Systems Engineering*

Major  
*Infotronics*

Professor  
*Prof. Silvan Zahno*  
*silvan.zahno@hevs.ch*

## Methods | Experiences | Results

This bachelor thesis focuses on the optimization of predictive maintenance systems within industrial IoT environments. Predictive maintenance is a key aspect of modern manufacturing, enabling the anticipation of equipment failures and reducing downtime. The research begins by outlining the theoretical foundations of predictive maintenance, including sensor data acquisition, processing, and analysis. The study then introduces advanced data processing algorithms, such as machine learning techniques, to enhance prediction accuracy and reliability. A case study approach is employed, using real-world industrial data to evaluate the system's performance. The results demonstrate significant improvements in fault detection rates and decision-making efficiency. The thesis concludes by discussing the implications for industry and providing recommendations for future development. This work aims to contribute to the advancement of smart maintenance systems, supporting industry 4.0 transformation efforts.

# Information about this report

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### Declaration of honor

I, undersigned, hereby declare that the work submitted is the result of a personal work.  
I certify that I have not resorted to plagiarism or other forms of fraud. All sources of  
information used and the author quotes were clearly mentioned

Place, date Sion, 24.02.2025

Signature



# Contents

Acknowledgements .....	1
Abstract .....	2
1 Introduction .....	3
1.1 Basic markup .....	3
1.2 Images .....	3
1.3 Tables .....	3
1.4 Boxes .....	4
1.5 Citations, Acronyms and Glossary .....	4
1.6 Code .....	5
1.7 Context Problem .....	5
1.8 Objectives .....	6
1.9 Structure of this report .....	6
2 Analysis .....	7
2.1 Section 1 .....	8
2.2 Section 2 .....	8
2.3 Conclusion .....	8
3 Design .....	9
3.1 Section 1 .....	10
3.2 Section 2 .....	10
3.3 Conclusion .....	10
4 Implementation .....	11
4.1 Section 1 .....	12
4.2 Section 2 .....	12
4.3 Conclusion .....	12
5 Validation .....	13
5.1 Section 1 .....	14
5.2 Section 2 .....	14
5.3 Conclusion .....	14
6 Conclusion .....	15
6.1 Project summary .....	15
6.2 Comparison with the initial objectives .....	15
6.3 Encountered difficulties .....	15
6.4 Future perspectives .....	15
Glossary .....	16

# Acknowledgements

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# Abstract

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**Keywords:**

*HEI-Vs, Systems Engineering, Infotonics, Thesis, Template*

# 1 | Introduction



Welcome to the template's introductory chapter! Instead of boring you with lorem ipsum, here's a quick guide to what you can do in Typst and, more specifically, in this template.

Need more? Check out the [Guide to Typst](#).

## 1.1 Basic markup

Typst lets you create bold, italic, or monospaced text with ease. You can also sprinkle in equations like  $e^{i\pi} + 1 = 0$  or even inline code like `fn main() { println!("Hello, World!") }`. And because life is better in color: pink, blue, yellow, orange, green, and more! **Boldly colorize!**

You can also write numbered or unnumbered lists:

- First item
- Second item
  - 1. First Subitem
  - 2. Second Subitem
- Third item

Need equations? Sure! They look great as blocks too:

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \dots = \sum_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)!} x^{2n+1}$$

## 1.2 Images

As they say, a picture is worth a thousand words. Let's add one:



Figure 2: Project logo

## 1.3 Tables

Tables are great for organizing data. From simple to complex, Typst handles them all:

Name	Age	City
Albert Einstein	25	Bern
Marie Curie	22	Paris
Isaac Newton	30	London


Table 1: Simple table

[31:27]			[24:20]		[19:15]		[14:12]		[11:7]		[6:0]		
funct5		aq	rl	rs2		rs1		funct3		rd		opcode	
5				5		5		3		5		7	


Table 2: Complex table

## 1.4 Boxes


Highlight key points with these fun boxes (and more):




Infobox: For highlighting information.




Ideabox: Share a brilliant idea.




Warningbox: Proceed with caution!



Firebox: This is 🔥!



Rocketbox: Shoot for the moon!



Todobox: Just do it!

### TODO

Personnal todo before marking this thesis as final

## 1.5 Citations, Acronyms and Glossary

Add citations with @ like [1] or [1, p.7ff] (stored in **/tail/bibliography.bib**).

Acronym terms like **Infotronics (IT)** expand on first use and abbreviate after **IT**. Glossary items such as **Rust Programming Language (Rust)** can also be used to show their description as such: Rust is a modern systems programming language focused on safety, speed, and concurrency. It prevents common programming errors such as null pointer dereferencing and data races at compile time, making it a preferred choice for performance-critical applications.. Acronyms and glossary entries auto-generate at the document's end (defined in **/tail/glossary.typ**).



## 1.6 Code

Besides writing inline code as such `fn main() { println!("Hello World") }` you can also write code blocks like this:

```

1 fn main() {
2     let ship = Starship::new("USS Rustacean", (0.0, 0.0, 0.0));
3     let destination = (42.0, 13.0, 7.0);
4     let warp = ship.optimal_warp(ship.distance_to(destination));
5
6     println!("🚀 {} traveling to {:?} at Warp {:.2}", ship.name, destination,
7 warp);
8     if warp <= 9.0 {
9         println!("⚡ Warp engaged!");
10    } else {
11        println!("⚠ Warp failed!");
12    }
13 }

```

Listing 1: First part of the USS-Rustacean code

or directly from a file

```

1 struct Starship {
2     name: String,
3     position: (f64, f64, f64),
4 }
5
6 impl Starship {
7     fn new(name: &str, position: (f64, f64, f64)) -> Self {
8         Self {
9             name: name.into(),
10            position,
11        }
12    }
13    fn distance_to(&self, dest: (f64, f64, f64)) -> f64 {
14        ((dest.0 - self.position.0).powi(2)
15         + (dest.1 - self.position.1).powi(2)
16         + (dest.2 - self.position.2).powi(2))
17        .sqrt()
18    }
19    fn optimal_warp(&self, distance: f64) -> f64 {
20        (distance / 10.0).sqrt().min(9.0)
21    }
22 }

```

Listing 2: Second part of the USS-Rustacean code from `/resources/code/uss-rustacean.rs`

## 1.7 Context Problem

Haute École d'Ingénierie (HEI) Rust Rust programs

[1], [1, p.7ff]

```

fn main() {
    println!("Hello World!");
}

```

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## **1.8 Objectives**

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## **1.9 Structure of this report**

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## 2 | Analysis

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### Contents

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2.1 Section 1 .....	8
2.2 Section 2 .....	8
2.3 Conclusion .....	8

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## 2.1 Section 1

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magnam aliquam quaerat voluptatem. Ut enim aequi doleamus animo, cum corpore dolemus, fieri tamen permagna accessio potest, si aliquod aeternum et infinitum impendere malum nobis opinemur. Quod idem licet transferre in voluptatem, ut.

## 2.2 Section 2

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## 2.3 Conclusion

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# 3 | Design

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## Contents

3.1 Section 1 .....	10
3.2 Section 2 .....	10
3.3 Conclusion .....	10

### 3.1 Section 1

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magnam aliquam quaerat voluptatem. Ut enim aequi doleamus animo, cum corpore dolemus, fieri tamen permagna accessio potest, si aliquod aeternum et infinitum impendere malum nobis opinemur. Quod idem licet transferre in voluptatem, ut.

### 3.2 Section 2

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### 3.3 Conclusion

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# 4 | Implementation

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## Contents

4.1 Section 1 .....	12
4.2 Section 2 .....	12
4.3 Conclusion .....	12

## 4.1 Section 1

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magnam aliquam quaerat voluptatem. Ut enim aequi doleamus animo, cum corpore dolemus, fieri tamen permagna accessio potest, si aliquod aeternum et infinitum impendere malum nobis opinemur. Quod idem licet transferre in voluptatem, ut.

## 4.2 Section 2

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## 4.3 Conclusion

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# 5 | Validation

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## Contents

5.1 Section 1 .....	14
5.2 Section 2 .....	14
5.3 Conclusion .....	14

## 5.1 Section 1

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## 5.2 Section 2

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## 5.3 Conclusion

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## 6 | Conclusion

### 6.1 Project summary

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### 6.2 Comparison with the initial objectives

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### 6.3 Encountered difficulties

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### 6.4 Future perspectives

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# Glossary

## Programming Language

*Rust* – Rust Programming Language: Rust is a modern systems programming language focused on safety, speed, and concurrency. It prevents common programming errors such as null pointer dereferencing and data races at compile time, making it a preferred choice for performance-critical applications. [4](#), [5](#)

## University

*HEI* – Haute École d'Ingénierie [5](#)

*IT* – Infotronics [4](#)

# Bibliography

- [1] S. Zahno *et al.*, “Dynamic Project Planning with Digital Twin,” *Frontiers in Manufacturing Technology*, vol. 3, May 2023, doi: [10.3389/fmtec.2023.1009633](https://doi.org/10.3389/fmtec.2023.1009633).