

Filière

Systèmes industriels

Orientation Infotronics

Thèse de Bachelor

Diplôme 2025

Firstname Lastname

Thesis Template

Longer Subtitle

Professeur
HEI-Vs, Prof. Silvan Zahno, silvan.zahno@hevs.ch

Expert
Company, Expert Name, expert@domain.ch

Date de soumission
14 August 2025





Thesis Template

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Objectif

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.

Thèse de Bachelor | 2025 |

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Orientation

Infotronics

Professeur

Prof. Silvan Zahno

silvan.zahno@hevs.ch

Méthodes | Expériences | Résultats

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.

Informations sur ce rapport

Coordonnées

Auteur: Firstname Lastname

Bachelor Étudiante

HEI-Vs

E-Mail: firstname.lastname@hevs.ch

Déclaration sur l'honneur

Je soussigné(e), déclare par la présente que le travail soumis est le résultat d'un travail personnel. Je certifie ne pas avoir eu recours au plagiat ou à d'autres formes de fraude. Toutes les sources d'information utilisées et les citations d'auteurs ont été clairement mentionnées.

Lieu, date: Sion, 24.02.2025

Signature:



Contenu

Remerciements	1
Résumé	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 Analyse	7
2.1 Section 1	8
2.2 Section 2	8
2.3 Conclusion	8
3 Conception	9
3.1 Section 1	10
3.2 Section 2	10
3.3 Conclusion	10
4 Implémentation	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
Glossaire	16

Remerciements

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Résumé

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Mots-clés:

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:



Fig. 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


Tableau 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	


Tableau 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 }
```

Liste 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 }
```

Liste 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 | Analyse

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Contenu

2.1 Section 1	8
2.2 Section 2	8
2.3 Conclusion	8

2.1 Section 1

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2.2 Section 2

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2.3 Conclusion

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3 | Conception

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Contenu

3.1 Section 1	10
3.2 Section 2	10
3.3 Conclusion	10

3.1 Section 1

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3.2 Section 2

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3.3 Conclusion

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4 | Implémentation

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Contenu

4.1 Section 1	12
4.2 Section 2	12
4.3 Conclusion	12

4.1 Section 1

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4.2 Section 2

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4.3 Conclusion

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5 | Validation

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Contenu

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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Glossaire

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](#)

Bibliographie

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