



Silesian  
University  
of Technology

## **FINAL PROJECT**

Thesis title in English

**First Names SURNAME**

Student identification number: **<your student id>**

**Programme:** Control, Electronic, and Information Engineering

**Specialisation:** Informatics

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**DEPARTMENT <departament name>**

**Faculty of Automatic Control, Electronics and Computer Science**

**CONSULTANT**

**<title first name surname>**

**Gliwice 2022**



**Thesis title**

Thesis title in English

**Abstract**

(Thesis abstract – to be copied into an appropriate field during an electronic submission – in English.)

**Keywords**

(2-5 keywords, separated with commas)

**Tytuł pracy**

Thesis title in Polish

**Streszczenie**

(Thesis abstract – to be copied into an appropriate field during an electronic submission – in Polish.)

**Słowa kluczowe**

(2-5 keywords, separated by commas, in Polish)



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# Chapter 1

## Introduction

- introduction into the problem domain
- settling of the problem in the domain
- objective of the thesis
- scope of the thesis
- short description of chapters
- clear description of contribution of the thesis's author – in case of more authors table with enumeration of contribution of authors





# Chapter 2

## [Problem analysis]

- problem analysis
- state of the art, problem statement
- literature research (all sources in the thesis have to be referenced [2, 1, 3, 4])
- description of existing solutions (also scientific ones, if the problem is scientifically researched), algorithms, location of the thesis in the scientific domain

Mathematical formulae

$$y = \frac{\partial x}{\partial t} \tag{2.1}$$

and single math symbols  $x$  and  $y$  are typeset in the mathematical mode.



# Chapter 3

## Requirements and tools

- functional and nonfunctional requirements
- use cases (UML diagrams)
- description of tools
- methodology of design and implementation



# Chapter 4

## External specification

- hardware and software requirements
- installation procedure
- activation procedure
- types of users
- user manual
- system administration
- security issues
- example of usage
- working scenarios (with screenshots or output files)

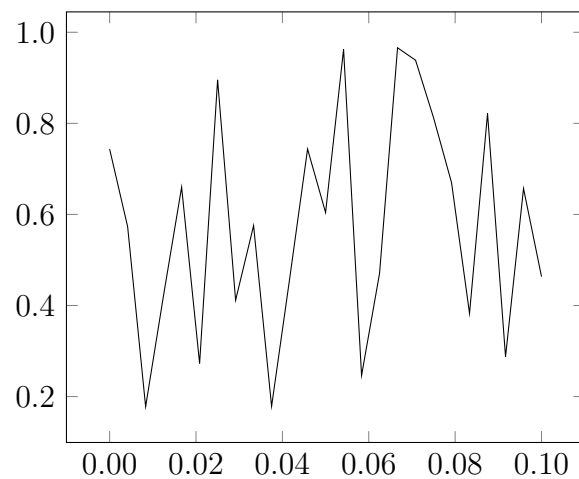


Figure 4.1: Figure caption (below the figure).



# Chapter 5

## Internal specification

- concept of the system
- system architecture
- description of data structures (and data bases)
- components, modules, libraries, resume of important classes (if used)
- resume of important algorithms (if used)
- details of implementation of selected parts
- applied design patterns
- UML diagrams

Use special environments for inline code, eg **int a;** (package `listings`). Longer parts of code put in the figure environment, eg. code in Fig. 5.1. Very long listings—move to an appendix.

---

```
1 class test : public basic
2 {
3     public:
4         test (int a);
5         friend std::ostream operator<<(std::ostream & s,
6                                         const test & t);
7     protected:
8         int _a;
9
10 };
```

---

Figure 5.1: Pseudocode in listings.



# Chapter 6

## Verification and validation

- testing paradigm (eg V model)
- test cases, testing scope (full / partial)
- detected and fixed bugs
- results of experiments (optional)

Table 6.1: A caption of a table is **above** it.

| $\zeta$ | method  |         |                |              |              |                      |                |
|---------|---------|---------|----------------|--------------|--------------|----------------------|----------------|
|         | alg. 1  | alg. 2  | alg. 3         |              |              | alg. 4, $\gamma = 2$ |                |
|         |         |         | $\alpha = 1.5$ | $\alpha = 2$ | $\alpha = 3$ | $\beta = 0.1$        | $\beta = -0.1$ |
| 0       | 8.3250  | 1.45305 | 7.5791         | 14.8517      | 20.0028      | 1.16396              | 1.1365         |
| 5       | 0.6111  | 2.27126 | 6.9952         | 13.8560      | 18.6064      | 1.18659              | 1.1630         |
| 10      | 11.6126 | 2.69218 | 6.2520         | 12.5202      | 16.8278      | 1.23180              | 1.2045         |
| 15      | 0.5665  | 2.95046 | 5.7753         | 11.4588      | 15.4837      | 1.25131              | 1.2614         |
| 20      | 15.8728 | 3.07225 | 5.3071         | 10.3935      | 13.8738      | 1.25307              | 1.2217         |
| 25      | 0.9791  | 3.19034 | 5.4575         | 9.9533       | 13.0721      | 1.27104              | 1.2640         |
| 30      | 2.0228  | 3.27474 | 5.7461         | 9.7164       | 12.2637      | 1.33404              | 1.3209         |
| 35      | 13.4210 | 3.36086 | 6.6735         | 10.0442      | 12.0270      | 1.35385              | 1.3059         |
| 40      | 13.2226 | 3.36420 | 7.7248         | 10.4495      | 12.0379      | 1.34919              | 1.2768         |
| 45      | 12.8445 | 3.47436 | 8.5539         | 10.8552      | 12.2773      | 1.42303              | 1.4362         |
| 50      | 12.9245 | 3.58228 | 9.2702         | 11.2183      | 12.3990      | 1.40922              | 1.3724         |

# Chapter 7

## Conclusions

- achieved results with regard to objectives of the thesis and requirements
- path of further development (eg functional extension ...)
- encountered difficulties and problems



# Bibliography

- [1] Name Surname and Name Surname. *Title of a book*. Hong Kong: Publisher, 2017. ISBN: 83-204-3229-9-434.
- [2] Name Surname and Name Surname. ‘Title of an article in a journal’. In: *Journal Title* 157.8 (2016), pp. 1092–1113.
- [3] Name Surname, Name Surname and N. Surname. ‘Title of a conference article’. In: *Conference title*. 2006, pp. 5346–5349.
- [4] Name Surname, Name Surname and N. Surname. *Title of a web page*. 2021. URL: <http://somewhere/on/the/internet.html> (visited on 30/09/2021).



# Appendices





# Index of abbreviations and symbols

DNA deoxyribonucleic acid

MVC model–view–controller

$N$  cardinality of data set

$\mu$  membership function of a fuzzy set

$\mathbb{E}$  set of edges of a graph

$\mathcal{L}$  Laplace transformation



# Listings

(Put long listings here.)

---

```
1 if (_nClusters < 1)
2     throw std::string ("unknown number of clusters");
3 if (_nIterations < 1 and _epsilon < 0)
4     throw std::string ("You should set a maximal number of
        iteration or minimal difference — epsilon.");
5 if (_nIterations > 0 and _epsilon > 0)
6     throw std::string ("Both number of iterations and minimal
        epsilon set — you should set either number of iterations
        or minimal epsilon.");
```

---



# List of additional files in electronic submission (if applicable)

Additional files uploaded to the system include:

- source code of the application,
- test data,
- a video file showing how software or hardware developed for thesis is used,
- etc.



# List of Figures

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