«Университет Иннополис»

ВЫПУСКНАЯ КВАЛИФИКАЦИОННАЯ РАБОТА
(БАКАЛАВРСКАЯ РАБОТА)
по направлению подготовки
09.03.01 - «Информатика и вычислительная техника»

GRADUATION THESIS
(BACHELOR'S GRADUATION THESIS)
Field of Study
09.03.01 – «Computer Science»

Направленность (профиль) образовательной программы
«Информатика и вычислительная техника»
Area of Specialization / Academic Program Title:
«Computer Science»

Тема / Topic	**Проектирование и реализация алгоритма адаптивного управления радиоресурсами в беспроводных сетях стандарта IEEE 802.11 с несколькими точками доступа / Design and Implementation of Adaptive Radio Resource Management algorithm in IEEE 802.11 multi-AP WLANs**

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Иннополис, Innopolis, 2023

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2 One kernel at x_s (dotted kernel) or two kernels at x_i and x_j (left and right) lead to the same summed estimate at x_s. This shows a figure consisting of different types of lines. Elements of the figure described in the caption should be set in italics, in parentheses, as shown in this sample caption. 16

3 One kernel at x_s (dotted kernel) or two kernels at x_i and x_j (left and right) lead to the same summed estimate at x_s. This shows a figure consisting of different types of lines. Elements of the figure described in the caption should be set in italics, in parentheses, as shown in this sample caption. 18

4 One kernel at x_s (dotted kernel) or two kernels at x_i and x_j (left and right) lead to the same summed estimate at x_s. This shows a figure consisting of different types of lines. Elements of the figure described in the caption should be set in italics, in parentheses, as shown in this sample caption. 20

5 One kernel at x_s (dotted kernel) or two kernels at x_i and x_j (left and right) lead to the same summed estimate at x_s. This shows a figure consisting of different types of lines. Elements of the figure described in the caption should be set in italics, in parentheses, as shown in this sample caption. 22

6 One kernel at x_s (dotted kernel) or two kernels at x_i and x_j (left and right) lead to the same summed estimate at x_s. This shows a figure consisting of different types of lines. Elements of the figure described in the caption should be set in italics, in parentheses, as shown in this sample caption. 24

Abstract

abstract ...

Chapter 1

Introduction

I Spacing & Type

This is a section. This is a citation without brackets. and this is one with brackets [1]. Multiple [1]–[3] Here's a reference to a subsection: 1.1.1. Citation of an online article [4]. Citation of an online proceeding [5]. The body of the text and abstract must be double-spaced except for footnotes or long quotations. Fonts such as Times Roman, Bookman, New Century Schoolbook, Garamond, Palatine, and Courier are acceptable and commonly found on most computers. The same type must be used throughout the body of the text. The font size must be 10 point or larger and footnotes[1] must be two sizes smaller than the text[2] but no smaller than eight points. Chapter, section, or other headings should be of a consistent font and size throughout the ETD, as should labels for illustrations, charts, and figures.

[1] This is a footnote.

[2] This is another footnote.

A. Creating a Subsection

1) Creating a Subsubsection:

2) Creating a Subsubsection:

3) Creating a Subsubsection:

a) This is a heading level below subsubsection: And this is a quote:

> Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

Fig. 1. One kernel at x_s (dotted kernel) or two kernels at x_i and x_j (left and right) lead to the same summed estimate at x_s. This shows a figure consisting of different types of lines. Elements of the figure described in the caption should be set in italics, in parentheses, as shown in this sample caption.

This is a table:

TABLE I
This Is a Table Example

A	B	C
a1	b1	c1
a2	b2	c2
a3	b3	c3
a4	b4	c4

The package "upgreek" allows us to use non-italicized lower-case greek letters. See for yourself: $\mathbf{\upbeta}$, $\boldsymbol{\upbeta}$, $\upbeta$, $\boldsymbol{\upbeta}$. Next is a numbered equation:

$$\|\mathbf{X}\|_{2,1} = \underbrace{\sum_{j=1}^{n} f_j(\mathbf{X})}_{\text{convex}} = \sum_{j=1}^{n} \|\mathbf{X}_{\cdot,j}\|_2 \tag{1.1}$$

The reference to equation (1.1) is clickable.

II Theorems, Corollaries, Lemmas, Proofs, Remarks, Definitions,and Examples

Theorem 1. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language.

There is no need for special content, but the length of words should match the language.

Proof. I'm a (very short) proof. □

Lemma 1. I'm a lemma.

Corollary 1. I include a reference to Thm. 1.

Proposition 1. I'm a proposition.

Remark. I'm a remark.

Definition 1. I'm a definition. I'm a definition. I'm a definition. I'm a definition. I'm a definition. I'm a definition. I'm a definition. I'm a definition. I'm a definition. I'm a definition. I'm a definition. I'm a definition.

Example. I'm an example.

III Section with linebreaks in the name

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of

the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

This is the second paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

Chapter 2

Literature Review

And after the second paragraph follows the third paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

After this fourth paragraph, we start a new paragraph sequence. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet

and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

I Another Section

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

With the widespread of computing systems, information processing, and net working, the practice of replacing paper documentation to electronic documentation has become more and more common. Electronic documentation within the workplace has several advantages over the traditional one, such as being easy to share, copy and edit the document. However, these advantages also present a problem. A malefactor, having access to the system, can easily copy and leak the document, without leaving any trace. Such actions are virtually undetectable in most systems, so, the malefactor goes unpunished. In this thesis, we propose one solution to the problem: digital watermarking.

Every electronic document within the protected system is marked with an invisible digital watermark, containing information about the user, accessing this particular document. Therefore, in case the protected company discovers the leaked document, they will be able to identify the machine of the malicious person and time when the document was leaked. This will allow inflicting punishment on the malefactor, recovering the costs of the leak, and potentially preventing future ones.

TABLE II
Simulation Parameters

A	B
Parameter	Value
Number of vehicles	$\mid \mathcal{V} \mid$
Number of RSUs	$\mid \mathcal{U} \mid$
RSU coverage radius	150 m
V2V communication radius	30 m
Smart vehicle antenna height	1.5 m

A	B
RSU antenna height	25 m
Smart vehicle maximum speed	v_{max} m/s
Smart vehicle minimum speed	v_{min} m/s
Common smart vehicle cache capacities	$[50, 100, 150, 200, 250]$ mb
Common RSU cache capacities	$[5000, 1000, 1500, 2000, 2500]$ mb
Common backhaul rates	$[75, 100, 150]$ mb/s

Fig. 2. One kernel at x_s (dotted kernel) or two kernels at x_i and x_j (left and right) lead to the same summed estimate at x_s. This shows a figure consisting of different types of lines. Elements of the figure described in the caption should be set in italics, in parentheses, as shown in this sample caption.

This description implies several essential properties of the task at hand:

1. Watermark must contain all necessary information, but still, be placeable and recognizable even on smaller images. The produced watermark must be compact but have the possibility to store enough information.

2. To prevent easy tampering, the watermark must be invisible to the naked eye (and, preferably, to basic image parsing tools). If malefactor does not know about the existence of watermark, they might not even try to remove it and disable it.

Chapter 3

Methodology

...

Referencing other chapters 2, 3, 4, 5 and 6

TABLE III
Simulation Parameters

A	B
Parameter	Value
Number of vehicles	$\mid \mathcal{V} \mid$
Number of RSUs	$\mid \mathcal{U} \mid$
RSU coverage radius	150 m
V2V communication radius	30 m
Smart vehicle antenna height	1.5 m
RSU antenna height	25 m
Smart vehicle maximum speed	v_{max} m/s
Smart vehicle minimum speed	v_{min} m/s
Common smart vehicle cache capacities	$[50, 100, 150, 200, 250]$ mb

A	B
Common RSU cache capacities	$[5000, 1000, 1500, 2000, 2500]$ mb
Common backhaul rates	$[75, 100, 150]$ mb/s

Fig. 3. One kernel at x_s (dotted kernel) or two kernels at x_i and x_j (left and right) lead to the same summed estimate at x_s. This shows a figure consisting of different types of lines. Elements of the figure described in the caption should be set in italics, in parentheses, as shown in this sample caption.

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Chapter 4

Implementation

TABLE IV
Simulation Parameters

A	B
Parameter	Value
Number of vehicles	$\mid \mathcal{V} \mid$
Number of RSUs	$\mid \mathcal{U} \mid$
RSU coverage radius	150 m
V2V communication radius	30 m
Smart vehicle antenna height	1.5 m
RSU antenna height	25 m
Smart vehicle maximum speed	v_{max} m/s
Smart vehicle minimum speed	v_{min} m/s
Common smart vehicle cache capacities	$[50, 100, 150, 200, 250]$ mb
Common RSU cache capacities	$[5000, 1000, 1500, 2000, 2500]$ mb
Common backhaul rates	$[75, 100, 150]$ mb/s

Fig. 4. One kernel at x_s (dotted kernel) or two kernels at x_i and x_j (left and right) lead to the same summed estimate at x_s. This shows a figure consisting of different types of lines. Elements of the figure described in the caption should be set in italics, in parentheses, as shown in this sample caption.

. . .

Chapter 5

Evaluation and Discussion

TABLE V
Simulation Parameters

A	B
Parameter	Value
Number of vehicles	$\mid \mathcal{V} \mid$
Number of RSUs	$\mid \mathcal{U} \mid$
RSU coverage radius	150 m
V2V communication radius	30 m
Smart vehicle antenna height	1.5 m
RSU antenna height	25 m
Smart vehicle maximum speed	v_{max} m/s
Smart vehicle minimum speed	v_{min} m/s
Common smart vehicle cache capacities	$[50, 100, 150, 200, 250]$ mb
Common RSU cache capacities	$[5000, 1000, 1500, 2000, 2500]$ mb
Common backhaul rates	$[75, 100, 150]$ mb/s

Fig. 5. One kernel at x_s (dotted kernel) or two kernels at x_i and x_j (left and right) lead to the same summed estimate at x_s. This shows a figure consisting of different types of lines. Elements of the figure described in the caption should be set in italics, in parentheses, as shown in this sample caption.

. . .

Chapter 6

Conclusion

TABLE VI
Simulation Parameters

A	B
Parameter	Value
Number of vehicles	$\mid \mathcal{V} \mid$
Number of RSUs	$\mid \mathcal{U} \mid$
RSU coverage radius	150 m
V2V communication radius	30 m
Smart vehicle antenna height	1.5 m
RSU antenna height	25 m
Smart vehicle maximum speed	v_{max} m/s
Smart vehicle minimum speed	v_{min} m/s
Common smart vehicle cache capacities	$[50, 100, 150, 200, 250]$ mb
Common RSU cache capacities	$[5000, 1000, 1500, 2000, 2500]$ mb
Common backhaul rates	$[75, 100, 150]$ mb/s

Fig. 6. One kernel at x_s (dotted kernel) or two kernels at x_i and x_j (left and right) lead to the same summed estimate at x_s. This shows a figure consisting of different types of lines. Elements of the figure described in the caption should be set in italics, in parentheses, as shown in this sample caption.

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Appendix A

Extra Stuff

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

Appendix B

Even More Extra Stuff

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.