

October, 2018

Curriculum Vitae

VEIKKO KERÄNEN



PERSONAL:

Date and place of birth: October 5, 1955, Ämmänsaari, Finland
Home address: Veitikantie 29-31, 96100 Rovaniemi, Finland
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EDUCATION:

Doctor of Philosophy, Oulu, 1986
Licentiate in Philosophy, Oulu, 1986
Master of Science, Oulu, 1982
Matriculation Examination, Suomussalmi, 1974

POSITIONS HELD:

1987 onwards	01.08.1987 – Principal Lecturer of Mathematics, Rovaniemi Institute of Technology / Rovaniemi Polytechnic / Rovaniemi University of Applied Sciences / Lapland University of Applied Sciences
1985–87	01.10.1985 – 31.07.1987 Assistant, University of Oulu, Faculty of Sciences, Department of Mathematics
1985–87	01.01.1985 – 31.07.1987 Research Assistant, Finnish Academy, Committee of Sciences
1982–84	01.08.1982 – 31.12.1984 Full-Time Teacher, University of Oulu, Faculty of Sciences, Department of Mathematics
1983	Teacher at the Teacher Training School of Oulu (6 days)
1981–82	01.08.1981 – 31.07.1982 Lecturer, Upper Secondary School and Upper Level of Comprehensive School of Kuopio
1979–80	11.10.1979 – 31.05.1980 Lecturer, Upper Secondary School of Haapajärvi

SECONDARY OCCUPATIONS:

2011 onwards	Adjunct Professor at University of Lapland, Faculty of Social Sciences
2009–2014	Visiting Professor of Tokyo Denki University, Graduate Program of the School of Information Environment
1996–2017	13 Training Courses for Teachers and Students of Univ. Lapland: Doing Mathematics by Computer (2 courses), Introduction to Algebra and Mathematical Reasoning (7), Cryptology (1), Linear Algebra (2), and Number Theory and Groups (1). Arranged jointly with Universities of Oulu and Lapland
2001	Training Course: Introduction to Mathematics in Polytechnics. Vocational Institute of Rovaniemi
1995–2000	Supervising of 10 M.Sc. Theses. University of Oulu
1993–94	3 Semesters of Training for Teachers (from BSc to MSc): Mathematical Logic, Discrete Mathematics, and Matrix Theory. University of Oulu

MEMBERSHIPS:

2015 onwards	STEM Centre Lapland / LUMA-keskus Lappi, Administrative Board http://www.luma.fi/en/centre/
2013 onwards	Engineering Entry Exam Committee of the Finnish Universities of Applied Sciences
2011 onwards	Corona Borealis - Astronomy Club, Administrative Board http://pohjankruunu.net/
2001 – 2003	01.01.2001 – 31.12.2003 Matriculation Examination Board of Finland (mathematics) http://www.ylioppilastutkinto.fi
2004 onwards	Assisting member of the above-mentioned examination board
2001 – 2003	18.10.2001 – 31.12.2003 National Board of Education, Curriculum Development for Upper Secondary School, Mathematics Working Group

Confidential Post:

1990–92	08.05.1990 – 08.05.1992 Trustee of AKAVA / Teachers of Technical Institutes in Finland in Rovaniemi Institute of Technology
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**PERSONAL SKILLS
AND
COMPETENCES:**

Mother tongue(s)

Finnish

Other language(s)

Self-assessment

European level (*)

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C2	Proficient user	C2	Proficient user	C1	Proficient user	C2	Proficient user	C2	Proficient user
B2	Independent user	B2	Independent user	B1	Independent user	B1	Independent user	B1	Independent user
B2	Independent user	B2	Independent user	B1	Independent user	B1	Independent user	B1	Independent user
A2	Basic user	A2	Basic user	A1	Basic user	A2	Basic user	A1	Basic user
A1	Basic user	B1	Independent user	A1	Basic user	A1	Basic user	A1	Basic user

English

Swedish

French

Japanese

German

(*) [Common European Framework of Reference for Languages](#)

Social skills and competences

Participation or leadership in many projects ranging from Mathematics Education to Algorithmic Information Theory, and to Computational Intelligence for Security and Emergency Management

Organisational skills and competences

One of the founding (three) members of the International *Mathematica* Symposium. Over 20 organised hands-on training events on Symbolic Computing.

Technical skills and competences

A good command of working practices and tools of forest work – typical recreational physical exercise in Finland ☺

Computer skills and competences

Long experience in Advanced Scientific and Technical Computing

Artistic skills and competences

Photography
<http://imageevent.com/veikkojkeranen>

Additional information

RESEARCH AREA: Theoretical Computer Science, Combinatorics on Words, Avoidable Regularities in Strings, and Symbolic Computation, with 30 scientific publications and over 50 conference talks.

Breakthrough result: Abelian squares are avoidable on 4 letters. In 1992, this paper, solving an old Erdős problem, was accepted for the leading ICALP conference with the highest credit points ever, at least at that time, in the 20-year history of the European Association for Theoretical Computer Science (founded in 1972). ICALP stands for the *International Colloquium on Automata, Languages and Programming*. See [11] in **PUBLICATIONS**.

Another extraordinary result is from 2007, when we found a powerful abelian square-free substitution over 4 letters. See [33] and [36] in **PUBLICATIONS**.

The involved computer experiments lead to remarkably complex, and counterintuitive, phenomena and to generation of extreme events.

Outside the field of Combinatorics on Words, our results have found applications in number theory, in algorithmic music, in cryptography, and they have aroused a considerable interest in bioinformatics and in security engineering (in generating possible but highly improbable random events).

The participation of very many students is gratefully acknowledged. Indeed, over the course of this long lasting research, the students have developed and coded a number of computer programs for generating strings with desirable properties, and they have set up and worked with the needed intensive distributed computations. All this has established an exciting and educational Computational Thinking process.

SOME RESEARCH ORIENTED PRESENTATIONS:

University of Oulu, Finland, January 1992 (invited).
University of Turku, Finland, March 1992 (invited).
Abelian Squares are Avoidable on 4 Letters, ICALP 92, Wien, Austria, July 1992.
Mathematica Days, Rotterdam, The Netherlands, September 1992.
University of Florence, Italy, October 1992 (invited).
Computer Aided Mathematics Seminar, Institute of Technology, Helsinki, Finland, November 1992.
7th International Conference on Automata and Formal Languages, Salgótarján, Hungary, May 1993.
Annual Meeting of Finnish Mathematicians, University of Vaasa, January 1995.
International *Mathematica* Symposium, *IMS '95*, Southampton, England, July 1995.
Abelian Square-Free Strings and Music, Videoconference between Rovaniemi Institute of Technology, Rovaniemi, Finland, and Columbia University, New York, USA, April 1996.

Several talks on Avoidable Patterns in Strings, and on Symbolic Computation at the International Arctic Seminar, Murmansk, Russia, April 1996 (invited), repeated also in May 1997, 1998, 1999. Topics for years 2002 and 2005 are mentioned separately in what follows.

http://algebra.fi/IMS/IAS_Events.html

Symposium on Logic, Mathematics and the Computer - History, Foundations and Applications, University of Helsinki, Helsinki, Finland, June 1996.

International Computer Music Conference, Thessaloniki, Greece, September 1997.

9th SEFI, European Seminar on Mathematics in Engineering Education, Espoo, Finland, June 1998 (invited).

Science and Mathematics Days (LUMA), Rovaniemi, April 2001.

Institut de Mathématiques de Luminy, Marseille, France, June 2001.

Mathematics Teaching Days X (attached material for the web), Häme Polytechnic, Forssa, November 2001.

New Abelian Square-Free DTOL-Languages over 4 Letters, International Arctic Seminar, Murmansk, Russia, May 2002.

Several presentations in Vaasa: Certain Aspects of Randomness, Complexity and Ontology (1 day), Some New Results in Combinatorics on Words (2 talks), New Curriculum for the Upper Secondary School in Finland, Vaasa, Finland, August 2002 (all invited).

Avoiding Abelian Patterns in Words, A talk in Stephen Wolfram's A New Kind of Science Conference, NKS 2004, Boston, USA, April 22-25, 2004.

<http://www.wolframscience.com/conference/2004/presentations/>

Visualizations of Abelian Pattern-Free Words, 6th International Arctic Seminar, Murmansk, Russia, May 2005.

Abelian Pattern-Free Words, University of Auckland, New Zealand, August 16, 2005. Organised by Cristian S. Calude.

Abelian Pattern-Free Words and Their Visualizations with Mathematica, Kincoppal-Rose Bay School, Sydney, Australia, August 22, 2005. Organised by Morris Needleman.

Abelian Square-Free Words with an Application to Cryptography (invited), University of Oulu, May 24, 2006.

Abelian Square-Free Words and Generation of Extreme Events, Optimal Synergy of Engineering and Life Sciences, Avignon, France, June 29, 2006. Organised by Gautam Dasgupta.

Experimental Mathematics with Applications - Pure Mathematics, Cryptography, Bioinformatics, Generation of Extreme Events, Quantitative Measures to Depict Progress Over Time, Ammattikorkeakoulujen matematiikan päivät 2006, Rovaniemi, Finland November 10, 2006.

Computational Intelligence for Security and Emergency Management, Tromsø University College, Faculty of Health and Social Sciences, Tromsø, Norway, January 16, 2007.

Mathematica in Research of Pattern Avoidance in Words, CADE 2007, Åbo Akademi University, Turku, Finland, February 20, 2007.

Pattern Avoidance in Words over Four Letters, University of Brasov, Romania, April 26, 2007.

Combinatorics on Words over 4 Letters (invited), Algebraic Biology 2007, RISC, Hagenberg, Austria, July 3, 2007.

Novel Findings for Combinatorics on Words by using Distributed Computing, Tokyo Denki University, Chiba Campus, Inzai City, Chiba Prefecture, Japan, February 27, 2008.

Emergency Management and Virtual Hospital Project in Nordic Countries and North-West Russia, Kagawa University, Faculty of Engineering, Takamatsu City, Kagawa, Japan, February 18, 2008. The talk, explaining the latest development, was repeated in February 2, 2009.

Civil Application of Security Engineering (CASE), Virtual Hospital, and Security in Barents Region, Tokyo Denki University, Chiba Campus, Inzai City, Chiba Prefecture, Japan, February 9, 2009.

EXIT (Smart Signs) Project and Combinatorics on Words Research, Tokyo Denki University, Chiba Campus, Inzai City, Chiba Prefecture, Japan, March 19, 2010, and Kagawa University, Faculty of Engineering, Takamatsu City, Kagawa, Japan, March 26, 2010.

China and Japan Lecturing Tour from September 18 to October 18, 2011. Nine lectures and workshops with topics ranging from Education in Finland (in general and in Engineering Education) to Combinatorics on Words Research.

China (到中国旅行报告): Harbin Normal University (HNU) 哈尔滨师范大学

Harbin (Ice City), Heilongjiang, China <http://www.hrbnu.edu.cn>

& Northeast Forestry University (NEFU) 东北林业大学

Harbin, Heilongjiang, China <http://en.nefu.edu.cn/about.php>

& Qiqihar (Green City), Heilongjiang, China

Qiqihar University (300 km North-East from Harbin) 齐齐哈尔大学

http://www.qghru.edu.cn/index_en.htm

http://www.qghru.edu.cn/Academics_en/1.htm (description of educational fields)

& Huarui College, Harbin, Heilongjiang, China, <http://www.hr-edu.com>

& Heilongjiang University (HLJU) 黑龙江大学

Harbin, Heilongjiang, China <http://school.cucas.edu.cn/HomePage/59>

Japan (日本への訪問のレポート): Tokyo Denki University (TDU) 東京電機大学

School of Information Environment (SIE)

Chiba New-Town Campus, Chiba-ken, Japan

http://atom.dendai.ac.jp/info_e/060424_985.html

& Kagawa University (KU) 香川大学

Faculty of Engineering, Takamatsu City, Kagawa, Japan

<http://www.kagawa-u.ac.jp/sub/english.html>

Abelian and Additive Square Avoidance in Words, [11th INTERNATIONAL MATHEMATICA SYMPOSIUM, IMS 2012](#), University College London, London, UK, 10 - 13 June, 2012.

Some dates and places of more recent presentations on Combinatorics on Words, Cryptography, Space Weather, and Polar Lights are listed below:

March 2013

Ravensburg-Weingarten University of Applied Sciences, Weingarten, Germany

May 2014

Murmansk State Technical University, Murmansk, Russia

October 2014, January 2015, September-October 2016
Mendel University, Brno, Czech Republic

April 2016
PXL-Tech University of Applied Sciences, Hasselt, Belgium

June 2016
SEFI Mathematics Working Group, Chalmers University of Technology,
Gothenburg, Sweden

January 2017
Combinatorics on Words, Calculability, Automata
CIRM - Luminy, Centre International de Rencontres Mathématiques
Luminy, Marseille, France

August 2017
Estonian tour on Education and Research, Tallinn, Tartu, Estonia

November 2017
International Maker's Day, Tsinghua University, Beijing, China

January-February 2018
IAS 2018 Rovaniemi, 7th International Arctic Seminar, STEM, Economics, Health
Care, and Education

EDITORIAL COMMITTEES:

International *Mathematica* Symposium, *IMS* 1995, 1997, 1999, 2001, 2003,
2004, 2005, 2006, 2008.
International Arctic Seminar on Engineering, Mathematics, Physics,
Computer Science, Economics, Health Care, and Education, *IAS* 2002 & 2005 &
2018
http://algebra.fi/IMS/IAS_Events.html
The *Mathematica* Journal, 2001
<http://www.mathematica-journal.com/issue/v8i2/>

EDUCATIONAL COMMITTEES:

Computer Aided Mathematics Seminar for the Teachers of Institutes of Technology, Rovaniemi Institute of Technology, Rovaniemi, Finland, November 1994.

Algorithmic Information and Automata Theory, 8-day international workshop on the use of Symbolic Computation in Theoretical Computer Science, May 1996.
<http://algebra.fi/keranen/TRAINING/MAY96.html>

Ammattikorkeakoulujen matematiikan päivät / Mathematics Days of Finnish Universities of Applied Sciences, Rovaniemi, November 9-10, 2006.
<http://algebra.fi/mate2006/>

Forthcoming Winter Days of Finnish Association of Teachers of Mathematics, Physics, Chemistry and Informatics MAOL, Rovaniemi, February 5-7, 2010.

Finnish Star Days (Tähtipäivät), Rovaniemi, February 23-28, 2016.
A great number of schools and kindergardens also participated – over 1000 participants altogether.

Ammattikorkeakoulujen MaFyKe-päivät / Mathematics, Physics and Chemistry Days of Finnish Universities of Applied Sciences, Kemi, May 11-12, 2017.

More Arranged Hands-on Training Courses on Advanced Scientific Computation (from 1 to 4 days) at the Rovaniemi Institute of Technology and Rovaniemi University of Applied Sciences:

Dr. Peter Mitic, LSU College of Higher Education, Southampton:

- 1) Numerical, Symbolic and Graphical Computing with *Mathematica*, November 1992.
- 2) Programming Paradigms in Procedural Languages and *Mathematica*, November 1994.

Professor Gautam Dasgupta, Columbia University, New York:

- 1) *Mathematica* - A New Paradigm for Technical Computing, August 1993.
- 2) Computer Aided Engineering Graphics, July 1994.
- 3) Symbolic Computational Mechanics, *MathLink* (Video Session between RIT and CU), November 1994.
- 4) *Mathematica* Teacher, June 1995.
- 5) Finite Element Methods with *Mathematica*, June 1995.
- 6) Numerical Methods. 2-day part of Summer High School, June 2000.
- 7) Graphics Programming with *Mathematica*, December 2006.

Conrad Wolfram, General Manager of Wolfram Research Europe Ltd.:
Mathematica - Why Teachers and Engineers Use It?, November 1994.

Veikko Keränen: Advanced Scientific Computing. A 4-day hands-on training course attended by 13 participants from Murmansk, Russia. Rovaniemi Institute of Technology, December 1995.

Summer High Schools:

Mathematica for High Schools. On 28-30 June 97 we organised in Rovaniemi a hands-on training course on the new opportunities offered by modern information technology for mathematics and science education. The event was supported by the Finnish Ministry of Education, and it was arranged in conjunction with the *IMS '97* conference. There were 10 expert teachers from all over the world giving presentations and guiding students during laboratory sessions. The event was attended by 120 upper secondary school students and 20 teachers from 50 Finnish (senior) high schools. June 1997.

<http://algebra.fi/keranen/hs.html>

More Summer High School Events at the School of Technology, Rovaniemi Polytechnic:

- 1) Information Technology as a Tool for Learning Mathematics and Physics (5 days). Hietamäki, Keränen, Teeriaho, June 1999.
- 2) Numerical Methods (6 days). Dasgupta, Hietamäki, Keränen, June 2000.

http://algebra.fi/keranen/RAMK_kesalukio_2000.htm

Virtual Educational Material:

A membership in the working group of national MatTaFi project to develop virtual material for mathematics education at the universities, polytechnics, and upper secondary schools in Finland. Directed by Lecturer Simo Kivelä, Helsinki University of Technology, Espoo (Otanemi), Finland. Started in February 2002.

Web based training course: An Introduction to Cryptology (this material was written in Finnish under the title Salausmenetelmät). A joint work together with Veikko Keränen, Jouko Teeriaho (RAMK), and Keijo Väänänen (University of Oulu). Published in 2007.

http://algebra.fi/keranen/math_techcomp.html

Automated Assessment Systems:

Hands-on training with Professor Jean-Pierre Boudine, Université de la Méditerranée, Marseille: Le progiciel de l'évaluation automatisée et sécurisée, S.E.A.S. - The secure automated assessment system, S.A.A.S. (2 days). Rovaniemi Polytechnic, May 2002.

<http://www.euro-test-institut.com>

Afterwards, there has been a number of other projects for developing digital educational materials.

EDUCATIONAL PRESENTATIONS:

Mathematica in Engineering Education, Rotterdam, September 1992 & London, England, September 1993.

Mathematica - A System of Doing Mathematics by Computer, University of Oulu, Finland, May 1994.

Symbolic Computing and Programming in Engineering Education, Nordic Conference on Teaching Mathematics, NORMA 94, Lahti, Finland, September 1994.

Educational Material of Mathematics in Internet, Computer Aided Mathematics Seminar for the Teachers of Institutes of Technology, Rovaniemi Institute of Technology, Rovaniemi, Finland, November 1994.

Mathematica Courseware (1) & *IMS '97* in Rovaniemi (2), *Mathematica* Developer Conference, University of Illinois, Champaign, USA, October 1995.

The 45th Anniversary Conference of Murmansk State Marine Academy, Murmansk, Russia, November 1995.

Computer Aided Mathematics Seminar for the Teachers of Institutes of Technology, Pori Institute of Technology, Pori, Finland, November 1995.

Lecturing Tour in the Baltic Countries and Russia. Lectures on scientific computing in the universities of Vilnius (Lithuania), Tartu (Estonia) and St. Petersburg (Russia), June 1996.

Applying Symbolic Computing, Seminar: Mathematics = Must, Rovaniemi, Finland, September 1996.

Computer Aided Mathematics - Specialising in Teaching Mathematics for Primary School, in co-operation with University of Lapland, Rovaniemi, Finland. Hands-on training. September-October 1996 & January - February 1997.

Using *Mathematica* Notebooks in Teaching. Annual Meeting of Finnish Mathematics and Science Teachers, Varkaus, Finland, January 1997.

Mathematica in Education and Research - a three day training event, The Second International Arctic Seminar on Physics and Mathematics, Murmansk State Pedagogical Institute, Murmansk, Russia. Training jointly with Gautam Dasgupta, Columbia Univ. and Klaus Sutner, Carnegie-Mellon Univ., June 1997.

Using *Mathematica* for Teaching Junior High School Mathematics through Sound and Image, Hands-on workshops at the European Educational Television Program & International Computer Music Conference, Thessaloniki, Greece. Training jointly with Gautam Dasgupta, Columbia University. During these six days, 300 participants - students, teachers and musicians - took part in our training, September 1997.

Advanced Technical Computing, The NORDUNI Conference, Murmansk State Technical University, Murmansk, Russia, October 1997.

Advanced Technical Computing in Education and Research, Keynote lecture at 9th SEFI, European Seminar on Mathematics in Engineering Education, Espoo, Finland, June 1998.

Mathematica in Education and Research - a three day training event, International Arctic Seminar Murmansk, Russia, May 1998 & 1999.

The Meaning of Mathematical Subjects in Technology, Seminar in Vaasa Polytechnic, March 2001.

Summer High Schools at the Rovaniemi Polytechnic, Science and Mathematics Days (LUMA), Rovaniemi, April 2001.

A-2-Free Strings. A lecture for 150 students at the International *Mathematica* Symposium, *IMS* 2001. Chiba Campus of Tokyo Denki University, Japan, June 2001.

History and Future of *IAS* and *IMS* Events, International Arctic Seminar Murmansk, Russia, May 2002.

The New Curriculum for Upper Secondary School (attached material for the web). Annual Winter Meeting of Finnish Mathematics and Science Teachers, Kajaani, Finland, February 2003 (invited).

Tutorial on Strings (jointly with Erik Jensen, attached material for the web), *IMS* 2003. Imperial College, London, England, July 2003 (invited).

Toiminnalliset sovellutukset matematiikan opetuksessa / Event for Mathematics Class Teachers, Kajaani, January 22-23, 2007.

Finnish Mathematical Educational System with Connections to PISA, Tokyo Denki University, Chiba Campus, Inzai City, Chiba Prefecture, Japan, February 12, 2008.

Salausmenetelmät (Cryptography) at Koulutusmessut (Education Fair), University of Lapland, November 22, 2008.

China and Japan Lecturing Tour from September 18 to October 18, 2011.

(more details of the tour can be found in the **SOME RESEARCH ORIENTED PRESENTATIONS** section)

Introduction into the Phenomenon of Polar Lights (Lecture 1), and Visualization Aspects of Northern Lights (Lecture 2), Hochschule Ravensburg-Weingarten, Germany, March 25-26, 2013.

Other, also educational, presentations from 2014 to 2017 (in Russia, Czech Republic, Belgium, Sweden, France, Estonia) were already mentioned above in the **SOME RESEARCH ORIENTED PRESENTATIONS** section.

New Trends in Finnish Mathematics Education, International Maker's Day, iCenter, Tsinghua University, Beijing, China, November 25, 2018.

STEM Survey – results, conclusions, discussion / Matematiikan, fysiikan ja kemian AMK-opetuksen kysely – tuloksia, johtopäätöksiä ja keskustelua (Keränen & Torvinen), Ammattikorkeakoulujen MaFyKe-päivät / Mathematics, Physics and Chemistry Days of Finnish Universities of Applied Sciences, Tampere, May 25, 2018. http://koti.tamk.fi/~umiikkal/MaFyKe/Sirpa_Torvinen.pdf

RESEARCH ORIENTED ORGANISING AND PROGRAM COMMITTEES:

International *Mathematica* Symposium, *IMS* 1995–2008 (Southampton (chair, 1995), Rovaniemi (chair, 1997), Hagenberg (1999), Tokyo (2001), London (2003), Banff, Alberta (2004), Perth (2005), Avignon (2006), Maastricht (2008).
<http://internationalmathematicasymposium.org/>

International Arctic Seminar, *IAS* 1996–2005 (6 events in Murmansk).
http://algebra.fi/IMS/IAS_Events.html

International Symposium: Logic, Mathematics and the Computer - History, Foundations and Applications, Univ. Helsinki, 1996. (Program Committee).

Algorithmic Information Theory, May 16-18, 2005, Vaasa, Finland (Program Committee). <http://lipas.uwasa.fi/ait05/>

Algebraic Biology, RISC, Hagenberg, Austria, 2007 & 2008. (Program Committee). <http://www.risc.uni-linz.ac.at/about/conferences/ab2007/>

Workshop: Emergency Management based on Information Technology, Tokyo Denki University, Chiba Campus, Inzai City, Chiba Prefecture, Japan, February 9, 2009.

Workshop: Joint Education and Research Workshop between RAMK and Faculty of Engineering, Kagawa University, Takamatsu City, Kagawa, Japan, October 14, 2011.

OTHER ACTIVITIES:

In 1994 and 1995, I was in charge of the *Scientific Computing* project supported by the Foreign Ministry of Finland. In this project we developed international co-operation between western and Russian scientists primarily in the area of Kola Peninsula.

From 1995 to 1997, together with Dr. Antero Hietamäki: *Applications of Advanced Scientific and Technical Computing* project supported by the Regional Council of Lapland and European Social Fund. The project aimed at increasing the visibility of Rovaniemi and Finnish Lapland in the field of computer aided mathematics, and making the region a more tempting environment for new high-tech enterprises to settle down. Moreover, we aimed at building a global network of experts in this field. In many respects, these goals were successfully reached.

In summer 1997, we organised in Rovaniemi a hands-on training course on the new opportunities offered by modern information technology for mathematics and science education. As explained in the *EDUCATIONAL COMMITTEES* section above, this event, *Mathematica Student*, 28-30 June 97, was attended by students and teachers from 50 different upper secondary schools of Finland. The project was supported by the Finnish Ministry of Education.

From 2000 to 2001, together with Dr. Antero Hietamäki: *Information Technology in Education and Applications of Mathematics* project aiming at publicizing modern information technology for mathematics teachers and students at various institutes in Lapland, as well as for enterprises. This work was also supported by the Finnish Ministry of Education.

In the research area of avoidable regularities in strings, over 20 students have worked 6 months or more in related programming projects. Most of these students have carried out their B.Sc. theses on this subject at the Rovaniemi University of Applied Sciences.

In summer 2005, I was working together with Ronald L. Rivest of MIT for his Internet publication entitled *Abelian Square-Free Dithering for Iterated Hash Functions*.

From 2006 to 2008, I was in charge of the TEKES Preparatory Project entitled *Computational Intelligence for Security and Emergency Management* (DNRO 2359/31/06).

From 2008 to 2011, I have been a member of the executive team preparing an EU application entitled Civil Application of Security Engineering (also called Emergency Management based on Information Technology). At present, partners come from Finland, Sweden, Norway, France, England, USA and Japan.

During February 5 - March 5, 2008, January 11 - February 11, 2009, March 13 - April 13, 2010, and October 3-18, 2011, I have been in education and research oriented exchange in Japan at the Tokyo Denki University, School of Information Environment. These journeys have also included lecturing visits to the Kagawa University in Takamatsu City on Shikoku Island. In September 2011, there was a similar exchange visit to five universities at Harbin and Qiqihar, Heilongjiang, China.

HOBBIES:

Photography. Please visit <http://www.imageevent.com/veikkojkeranen>

REFEREEING OF MATHEMATICAL PAPERS AND DISSERTATIONS:

October 1996: A paper for Journal of Discrete Applied Mathematics.

February 1997: A paper for the ICALP '97 conference.

Summer 1997: I was a referee (together with Wojciech Plandowski) of Ismo Hakala's dissertation "On Word Equations and the Morphism Equivalence Problem for Loop Languages". The assignment was for the Faculty of Science, University of Oulu. Hakala defended his thesis in Oulu, 13 December 1997.

July 2002: A paper for Journal of Automata, Languages and Combinatorics.

June 2003: A paper for Journal of Automata, Languages and Combinatorics.

Afterwards, refereeing of papers has continued for different journals at the rate of one or two papers per year.

PUBLICATIONS OF VEIKKO KERÄNEN:

[n*] denotes selected paper, [n€] denotes selected editorial or organising committee work)

- [1] V. KERÄNEN, On L. Wegner's problem in the general case, *Bulletin of the European Association for Theoretical Computer Science* 19, EATCS, 1983, 24-31.
- [2] V. KERÄNEN, On k-repetition freeness of length uniform morphisms over a binary alphabet, *Discrete Applied Mathematics* 9, 1984, 297-300.
- [3] V. KERÄNEN, On k-repetition freeness of length uniform morphisms over a binary alphabet, *Proceedings of the 3rd International Meeting of Young Computer Scientists* (Smolenice, Czechoslovakia), *Tanulmányok* 158, 1984, 106-118.
- [4] V. KERÄNEN, On k-repetition free words generated by length uniform morphisms over a binary alphabet, *Report of the Department of Mathematics*, Faculty of Science, University of Oulu, 1984, 89 pages.
- [5] V. KERÄNEN, On k-repetition free words generated by length uniform morphisms over a binary alphabet, *Lecture Notes in Computer Science*. 623, ICALP 85, Nafplion, Greece, Springer-Verlag, 1985, 338-348.
- [6] V. KERÄNEN, On k-repetition free words generated by length uniform morphisms over a binary alphabet, *Proceedings of the Second Finnish Summer School on Theoretical Computer Science*, University of Turku, 1985, 72-84.
- [7] E. IJÄS and V. KERÄNEN, Students' self-image and its connections with motivation, success in studies and gender (in Finnish), in M. Huhanantti and T. Keranto, *The New Challenges of Teaching Physics and Chemistry*, Report of Faculty of Pedagogics 14, University of Oulu, 1985, 63-64.
- [8] V. KERÄNEN, Repetition free words generated by morphisms, *Proceedings of the Meeting of Finnish Mathematicians*, Department of Mathematical Sciences, University of Turku, 1986, 32-35.
- [9] V. KERÄNEN, On the k-freeness of morphisms on free monoids (doctoral thesis), *Annales Academiae Scientiarum Fennicae, Series A, I. Mathematica Dissertationes* 61, Finnish Academy of Science, Helsinki, 1986, 55 pages.
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