



7-9 July 2015

Zilina - Slovakia



The International Conference on
**Information and Digital
Technologies 2015**



IEEE

ESRA

Dear participants.

We have the pleasure to invite you to attend the International Conference on Information and Digital Technologies (IDT 2015), which is held in Žilina, Slovakia, on July 7-9, 2015. This conference starts in this year as one of ways of the development of the International Conference on Digital Technologies that is held at University of Žilina (Žilina, Slovakia) traditionally. The theme of the Conference IDT 2015 reflects the vital role of information technology in many evolving areas of basic and applied research. The Conference aims are defined by special Workshops organized under IDT 2015:

- International Workshop on Biomedical Technologies;
- International Workshop on Reliability Technologies;
- 5th Workshop on Green and Safe Computing and Communication (GreenSCom2015)

One more event is organized under the Conference as the section CERES - Section of Young Researchers and Scientists. Section CERES is intended for young researchers, scientists and educators, aims to establish and expand international contacts and co-operation. There are also be several tutorial short courses and lectures offered free of charge to the participants.

The Conference IDT 2015 is supported by the IEEE Reliability Society and European Safety and Reliability Association (ESRA). The local organizer in Slovakia is Information Sciences and Management Faculty of University of Žilina.

More than 130 papers from 19 countries were obtained and evaluated by at least two peers per paper. Finally, about 60 of them have been selected and accepted after revision in accordance with reviewers' comments. Each paper has been reviewed by at least two peers per paper. The approved papers are organized into 4 plenary presentations, 12 working sections and poster section. In the plenary sessions, distinguished plenary speakers give a review of the future perspectives in their research areas: information technologies, biomedical information applications, telecommunication and reliability.

We would like to thank all the authors for their efforts in preparing interesting papers and we hope that you will enjoy your participation in these events and your stay in Žilina. We hope that these events will let us to wide our knowledge, to strengthen the contacts and will stimulate our researches and increase an optimism.

We are sure that these events will have a success and wish you an interesting and pleasant work.

July 2015

The organizers

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Time Schedule

Tuesday, July 7, 2015				
08.00-10.00	Registration			
10.00-10.30	Opening of the Conference (room C-9)			
10.30-11.30	The First Plenary Section (room C-9)		Poster Section under CERES Project GreenCo meeting*	
11.30-12.00	Coffee/tea			
12.00-13.00	The Second Plenary Section (room C-9)			
13.00-14.00	Lunch			
14.00-15.40	Section R1 room C-1	Section A1 room C-6		Section C1 room C-9
16.00-21.00	Tour of the Bytča and dinner			
Wednesday, July 8, 2015				
09.30-11.30	The Third Plenary Section (room C-9)		Poster Section under CERES GreenCo meeting*	
11.30-12.00	Coffee/tea			
12.00-13.00	Section R2 room C-1	Section A2 room C-6		Section C2 room C-9
13.00-14.00	Lunch			
14.30-21.00	Excursion to Orava Castle and dinner			
Thursday, July 9, 2015				
09.30-11.30	Section R3 room C-1	Section CERES room C-6	Section B room C-9	Poster Section under CERES Project GreenCo meeting*
11.30-12.00	Coffee/tea			
12.00-13.00	The Fourth Plenary Section (room C-9)			
13.00-14.00	Lunch			
14.00-15.15	Section D room C-1	Section A3 room C-6	Section C3 room C-9	
15.15-15.30	Closing ceremony (room C-9)			
15.30-16.00	Coffee/tea			
16:00-18:30	CERES -TEMPUS management session (room C-9) GreenCo-TEMPUS management session (room C-1)			

*According with full programs of the CERES-TEMPUS meeting and GreenCo-TEMPUS meeting

Detailed Schedule

Venue: Information Sciences and Management Faculty,
University of Žilina,
Univerzitná 8215 / 1

Tuesday, July 7

Opening of the Conference

10:00-10:30 (room C-9)

Welcome words of the Dean of Information

Sciences and Management Faculty

Dr. Emil Kršák

Welcome words of the CoChair of the Workshop on RT

Prof. Radim Bris

Welcome words of the CoChair of the Workshop on BT

Dr. Krzysztof Pancierz

Welcome words of the Chair of the GreenSCom

Prof. Vyacheslav Kharchenko

Welcome words of the Organizers

Dr. Elena Zaitseva

The First Plenary Section. Reliability Technologies.

10:30-11:30 (room C-9)

Moderators: Prof. Radim Bris, Czech Republic

Assistant: Jozef Kostolny, Slovakia

Prof. Krzysztof Kołowrocki (Poland)

Reliability of Large and Complex Systems: Asymptotic Approach Research

The Second Plenary Section. Reliability Technologies.

12:00-13:00 (room C-9)

Moderators: Prof. Marko Cepin, Slovenia

Assistant: Jozef Kostolny, Slovakia

Prof. Radim Bris (Czech Republic)

New Computing Technology in Reliability Engineering

Section R1: Reliability Technologies and GreenSCom

14:00-15:40 (room C-1)

Chair: Prof. Krzysztof Kolowrocki, Poland

Assistant: Miroslav Kvassay, Slovakia

Krzysztof Kolowrocki, Kwiatkowska-Sarnecka Bożena and Joanna Soszynska.

Reliability and risk optimization of a bulk cargo transportation system

Marko Cepin.

Evolution of Probabilistic Safety Assessment and its

Eugene Babeshko, Vyacheslav Kharchenko, Oleg Odarushchenko, Volodymyr Sklyar

Toward automated FMEDA for complex electronic products

Anton Kamenskih and Sergey Tyurin.

The Development of Basic Logic Element for Strictly Self-timed FPGA

Laurentiu Padeanu, Marcus Svoboda, Flaviu Mihai Frigura-Iliasa, Petru Andea.

Human Machine Interface for a SCADA System applied on a District Heating Power Plant

Ah-Lian Kor, Colin Pattinson, Ismail Imam, Ibrahim AlSaleemi and Oluwafemi Omotosho.

Applications, Energy Consumption and Measurement

Section A1

14:00-15:40 (room C-6)

Chair: Dr. Alexei Belotserkovsky, Belarus

CoChair: Dr. Karol Grondzak, Slovakia

Stanislau Shyrai and Dmitri Viattchenin.

Clustering the Intuitionistic Fuzzy Data. Detection of an Unknown Number of Intuitionistic Fuzzy Clusters in the Allotment

Alexander Bazhanov, Valery Magergut and Roman Vashchenko.

Operation model of the cement kiln node "Material temperature in the drying zone" as a fuzzy behavior chart

Yury Savitsky and Anton Savitsky.

Technique of Learning Rate Initialization for Efficient Training of MLP: Using for Computing of Lyapunov Exponents

Jan Hovad, Martin Lnenička and Jitka Komarkova.

Real-Time Web Mining Application to Support Decision-Making Process

Alexander Nedzved, Alexei Belotserkovsky and Pavel Lukashevich.

Building the Regional System For Seismic Data Processing

Sergey Stankevich and Anna Kozlova.

Long-term land cover change computer-aided mapping by remote sensed imagery

Section C1

14:00-15:40 (room C-9)

Chair: Dr. Iosif Androulidakis, Greece

Assistant: Michal Kvet, Slovakia

Costas Chaikalis, Charalampos Liolios and Vasileios Vlachos.

An adaptable LTE turbo decoder for indoor/low range outdoor environment: A study on low bit rates

Antoni Masiukiewicz, Iwona Dolińska and Mariusz Jakubowski.

Location Ability of 802.11 Access Points

Iosif Androulidakis, Vasileios Vlachos and Periklis Chatzimisios.

A methodology for testing battery deprivation denial of service attacks in mobile phones

Iosif Androulidakis, Vasileios Vlachos and Costas Chaikalis.

An application free method to locate a mobile phone in a given area without user consent or provider help

Antoni Masiukiewicz, Iwona Dolińska, Mariusz Jakubowski, Grzegorz Rządowski and Jarosław Sobol.

Improvement of Content Window Size Selection Algorithm for Small 802.11n Networks

Hana Kopackova.

Characteristics of digital natives generation in the context of mobile learning

Wednesday, July 8

The Third Plenary Section

09:30-11:30 (room C-9)

Moderators: Dr. Penka Martincova, Slovakia

Assistant: Jozef Kostolny, Slovakia

Prof. Michitaka Kameyama (Japan)

Prospects of Computing Platform for Real-World Intelligent Systems

Dr. Krzysztof Pancierz (Poland)

Toward Classification of Data Coming from Evaluation Sheets of Subjects with ASDs

Section R2: Reliability Technologies and GreenSCom

12:00-13:00 (room C-1)

Chair: prof. Radim Briš, Czech Republic

Assistant: Miroslav Kvassay, Slovakia

Miroslav Kvassay, Elena Zaitseva, Jozef Kostolny and Vitaly Levashenko.

Importance Analysis of Multi-State Systems based on Integrated Direct Partial Logic Derivatives

Radim Briš.

Risk Modelling of Personnel Fatality at Accidents on Offshore Installations

Irina Fuks and Gennady Koshkin.

Smooth Recurrent Estimation of Multivariate Reliability Function

Robert Skopal.

Short-term hourly price forward curve prediction using Neural network and hybrid ARIMA-NN model

Section A2

12:00-13:00 (room C-6)

Chair: Dr. Alexander Nedzved, Belarus

Assistant: Michal Kvet, Slovakia

Jan Panuš and Hana Jonášová.

Students' behavior on internet social networks as a base for e-learning tools

Michal Kvet.

Index distribution management in attribute level temporal model

Stanislava Šimonová and Ales Hudec.

Enterprise Content Management Based on Identified Requirements

Renata Bilkova and Renata Machova.

Affect e commerce services the use of services offered by eGovernment?

Section C2

12:00-13:00 (room C-9)

Chair: Prof. Vasileios Vlachos, Greece

Assistant: Zuzana Skutchanova, Slovakia

Jacek Klucznik and Stanislaw Czapp.

Computer-Aided Calculations of Earth Potential Rise in High Voltage Overhead Lines

Maciej Sulowicz, Marcin Jaraczewski, Konrad Weinreb, Ryszard Mielnik and Tomasz Żywczak.

The method of current measurement in the rotor cage bars of prototype induction motor with the use of Rogowski coils

Robert Malkowski, Stanislaw Czapp, Robert Kowalak and Maciej Losinski.

Study of the Operation of Synchronous Generator Voltage Regulator During the Creation of Post Blackout Start-up Path

Jan Staszak, Krzysztof Ludwinek, Zbigniew Gawęcki, Jarosław Kurkiewicz, Tomasz Bekier, Marek Jaśkiewicz

Utilization of Permanent Magnet Synchronous Motors in Industrial Robots

Section R3: Reliability Technologies and GreenSCom

9:30-11:30 (room C-1)

Chair: Prof. Vyacheslav Kharchenko, Ukraine

Assistant: Miroslav Kvassay, Slovakia

Emil Delic, Karolin Löser, Ali Hayek and Josef Börcsök.

Platform Independent Safety-Critical Operating System

Vyacheslav Kharchenko, Andriy Kovalenko, Vladimir Sklyar, Olexandr Siora.

Security Assessment of FPGA-based Safety-Critical Systems: US NRC Requirements Context

Dmitry Yudin, Sergey Frolov, Valery Magergut and Vasiliy Rubanov.

Statistical Methods Analysis of Green Control of Complex Energy-Intensive Object

Gennadij Linets, Lev Fomin and Oksana Mezentseva.

Green Technologies in Identification Systems of Transport Telecommunication Networks

Pavel Skalný.

Application of Gaussian Mixtures in the Fracture Identification

Yuliya Artsiomchyk and Helena Zhivitskaya.

Improving the Supply Chain Efficiency Based on Reliability Analysis

Nicolae Iacobici-Luca, Doru Vatau, Flaviu Mihai Frigura-Iliasa, Petru Andea.

Expert System Dedicated for the Assessment of the Electromagnetic Field Parameters on a Transelectrica-Romania Power Station

Sergey Nechausov, Georgiy Kuchuk and Vyacheslav Kharchenko.

Two-Stage Optimization of Resource Allocation for Hybrid Cloud Data Store

Section CERES

9:30-11:30 (room C-6)

Chair: Prof. Vitaly Levashenko, Slovakia

Assistant: Michal Kvet, Slovakia

Lukáš Semerád, Filip Orság and Martin Drahanský.

Biometric Intelligence and Its Application

Vitaly Levashenko, Elena Zaitseva, Jozef Kostolny and Miroslav Kvassay.

Induction of Fuzzy Decision Trees

Sergey Subbotin.

The Set of Data Transformations for Dimensionality Reduction in Diagnosis

Svetlana Ostroukhova and Mikhail Tatur.

Technical Vision System Designed to Analyze the Quality of Seeds

Petra Poklonova, Jan Rabcan, Roman Behul, Roman Geso, Branislav Pika
Development of the support system for analysis of the correlation psychological characteristics and signature properties

Dzmitry Karzhounik and Natalia Lapitskaya.
Automating the creation of OLAP-cubes on the base of MS SQL AS for optimization of the infrastructure of Informational analytical system of the region

Fiodor Tretyakov and Liya Serebryanaya.
Automatical Universal Decimal Classification based on Frequency Advanced Method

Ihor Derevyanko and Oleksandr Zhadanos.
Researching of Thermophysical Processes in Acheson Furnace for the Production of Silicon Carbide to Develop Automatic Process Control System

Section B: Biomedical Technologies

9:30-11:30 (room C-9)

Chair: Dr. Krzysztof Pancierz, Poland

Assistant: Renata Tothova, Slovakia

Jaroslav Majernik, Miriam Dziakova and Jozef Živčák.
Rehabilitation in Children with Neurological Disorders Using Whole Body Vibration

Krzysztof Pancierz.
On Selected Functionality of the Classification and Prediction Software System (CLAPSS)

Renata Tothova, Iveta Jancigova and Martin Busik.
Calibration of elastic coefficients for spring-network model of red blood cell

Katerina Janurova.
Mortality risk modelling in colorectal surgery using Weibull accelerated failure time regression model

Pavlna Kuráňová.
Evaluation of the Phadiatop test results using Chaid algorithm and logistic regression

Sergey Subbotin, Andrii Oliinyk and Stepan Skrypsky.
Individual prediction of the hypertensive patient condition based on computational intelligence

Lukáš Semerád and Martin Drahanský.
Biometric entropy of retina

Žaneta Miklová.
Survival analysis of patients after colorectal surgery

Warren Adam Shier and Svetlana Yanushkevich.
Biometrics in Human-Machine Interaction

The Fourth Plenary Section.

12:00-13:00 (room C-9)

Moderators: Dr. Jaroslav Majernik, Slovakia

Assistant: Jozef Kostolny, Slovakia

Dr. Iosif I. Androulidakis (Greece)

When smartphones are neither available nor green

Section D

14:00-15:15 (room C-1)

Chair: Prof. Sergey Subbotin, Ukraine

Assistant: Michal Varga, Slovakia

Karol Grondžák and Juraj Branický.

On the Fast Bit Counting Algorithms of Large Arrays

Marek Kvet.

Exact and Heuristic Radial Approach to Fair Public Service System Design

Michal Čadecký, Michal Varga and Norbert Adamko.

Mesosopic movement model of deliberative pedestrian agents

Mikhail Tatur, Marina Lukashevich, Dzmitry Adzines and Yerzhan Seitkulov.

Data Mining Processing Based on Problem-oriented Machine Architecture

Julia Drozd and Alex Drozd.

A Resource-based Approach and Methods of Multiply Effects in Computer World

Section A3

14:00-15:15 (room C-6)

Chair: Prof. Michitaka Kameyama, Japan

CoChair: Dr. Martin Lukac, Japan/Kazakhstan

Assistant: Matus Chochlik, Slovakia

Pavel Lukashevich, Alexei Belotserkovsky and Alexander Nedzved.

The New Approach for Reliable UAV Navigation Based on Onboard Camera Image Processing

Michael Dossis, Dimitrios Amanatidis and Iosif Androulidakis.

Using Behavioural Synthesis for hardware generation of a contour-based image segmentation algorithm

Martin Lukac, Kamila Abdiyeva and Michitaka Kameyama.

On Evaluation of Algorithm Selection Approach for Semantic Segmantation Based on High-Level Information Feedback

Lukas Falat, Martina Hlinkova and Lucia Pancikova.

Prediction Model for High-Volatile Time Series based on SVM Regression Approach

Matus Chochlik, Penka Martincova and Jozef Kostolny

Searching for hidden patterns in large genetic database

Section C3

14:00-15:15 (room C-9)

Chair: Prof. Gennady Koshkin, Russian Federation

Assistant: Martin Busik, Slovakia

Jozef Papán, Pavel Segeč and Peter Palúch.

Analysis of Existing IP Fast Reroute Mechanisms

Stanislav Kovář, Jan Valouch, Hana Urbančoková and Milan Adámek.

Electromagnetic interference of CCTV

Mohammed Bakkali and Carlos Mascareñas-Perez-Iñigo.

Real Time Digital Signal Processing and Measurement Method for Electromagnetic Compatibility Verification into the Ships

Marcus Svoboda, Liliana Matiu-Iovan, Flaviu Mihai Frigura-Iliasa, Petru Andea

B-spline Interpolation Technique for Digital Signal Processing

Jiri Vodrazka.

Potential of Communication Cables in Industry for Gigabit Transmission Rates

Ihor Derevyanko and Oleksandr Zhadanos (extra conference CERES presentation).

Researching of Thermophysical Processes in Acheson Furnace for the Production of Silicon Carbide to Develop Automatic Process Control System

Welcome to the metropolis of Northwest Slovakia



Žilina is a natural centre of north-western Slovakia and with a population of 84 225 inhabitants (as per January 2013) it ranks among the largest cities in Slovakia. Žilina is situated around 200 km from Bratislava, the capital of Slovakia.

Žilina is located in the valley of the Váh river, in the Žilina Basin, at the confluence of the Váh river with its tributaries Kysuca and Rajčanka. The Žilina Basin is

surrounded by the mountain ranges of Malá Fatra (Lesser Fatra), Strážovské vrchy (Strážov Hills), Súľovské vrchy (Súľov Hills), Javorníky and Kysucká vrchovina (Kysuce Highlands).

Žilina is a centre of significant political, cultural, sport and public health care institutions. The city of Žilina is the seat of the Žilina Region. Together with the Region, it keeps a stable position of the second or third place in gross domestic product per inhabitant. Its economic potential can be proven by the fact that Žilina has the biggest number of traders per thousand inhabitants. As for the number of joint stock companies and limited companies, Žilina keeps third position in Slovakia. The Slovak Commercial and Industrial Chamber in Žilina is the second biggest in Slovakia.

Nowadays, the city of Žilina represents a dynamic development accelerated by KIA Motors Slovakia investments. However, the City is not only a centre of car production, but together with the Upper Váh River Region (Horné Považie), it is an interesting tourist destination.

Interesting events held in the city of Žilina and its surroundings during the year (Carnival Slovakia, Central European Festival of Concert Art, Old Town Festival, Folklore Festival in Terchová, Medieval Day, Rajec Marathon etc.) make the development of the City tourism more dynamic.

The city of Žilina is a centre of theatres, museums, galleries, parks and sports facilities. Its historical centre is crossed by one of the longest and the most beautiful pedestrian zones in Slovakia.



Orava Castle

Orava Castle (Oravský hrad) is situated on a high rock above Orava river in the village of Oravský Podzámok. The Castle stands on the site of an old wooden fortification, built after the Mongol invasion of Hungary of 1241. The original design was in Romanesque and Gothic style; it was later reconstructed as a Renaissance and Neo-Gothic structure, hugging the shape of the 520-metre spur on which it perches.

The mining magnate Thurzo family, who took charge in the mid 16th century, were responsible for a great deal of rebuilding work, although its present form was not finalised until 1611. It burned down again in 1800, after which it was no longer used as a residence. And then, after a period of dilapidation and World War II, the castle became a national monument.



The natural rock formation known as "castle cliff" – a limy spur 112 meters high, surrounded by the Orava River and its right tributary stream Racova – has been inhabited since primeval times. During its history a wooden rampart became a strong walled castle of which the first written record dates back to 1267. At that time only the ground floor was built of stone, while the upper floors were made of wood.

In 1370 as part of the Hungarian Kingdom the castle became the center of Árva county. A tetrahedral multi-story tower was built here in the 14th century, probably on older foundations, as a donjon – the place of "last defense" within the castle. After 1474, King Matthew gave orders to build a square and a residence-wing in the Middle Castle. The buildings were situated in front of the castle. In 1534 John of Dubovec obtained the castle and became head of the county. He started to rebuild the castle and to make new fortifications. He ordered the building of a half-round tower in the Upper Castle that in 1539 was followed by two large round fortifications for cannons in the Middle Castle. The middle platform was also configured for cannon firing. In the years 1539 – 1543 John of Dubovec built a five-story palace in the empty space between the tower and the stone wall of the Upper Castle. A new gate with a ditch and drawbridge in the Lower Castle was completed in 1543. The Tower of the Archives was built against the castle walls.

After the death of John of Dubovec, his heirs quarreled over the inheritance and the situation became so bad that the castle even became a store-house. It was paid for by

the mine owner Ferenc Thurzó. A lot of building activity took place at the castle following this time period. The wooden stairs in the Upper Castle were replaced by stone stairs. The same was done to the stairs between the Middle and the Upper Castle with the drawbridge. A cellar was also dug out of the stone of the castle court and a one-story residence-wing was built in the Lower Castle near the west wall.

György Thurzó also carried out some important repairs. One of the first was the building of a tunnel between both castle gates, above which was formed a large terrace. After this was all done he moved the living-quarters and the building of the Chapel started using parts of some old architecture. The interior furnishing of the Chapel was later arranged in a taste which suited the new owners of the Castle. One of the most well-known features is the Renaissance grave tomb of György Thurzó from the beginning of the 17th century and the Baroque altar from 1751 - 1752.

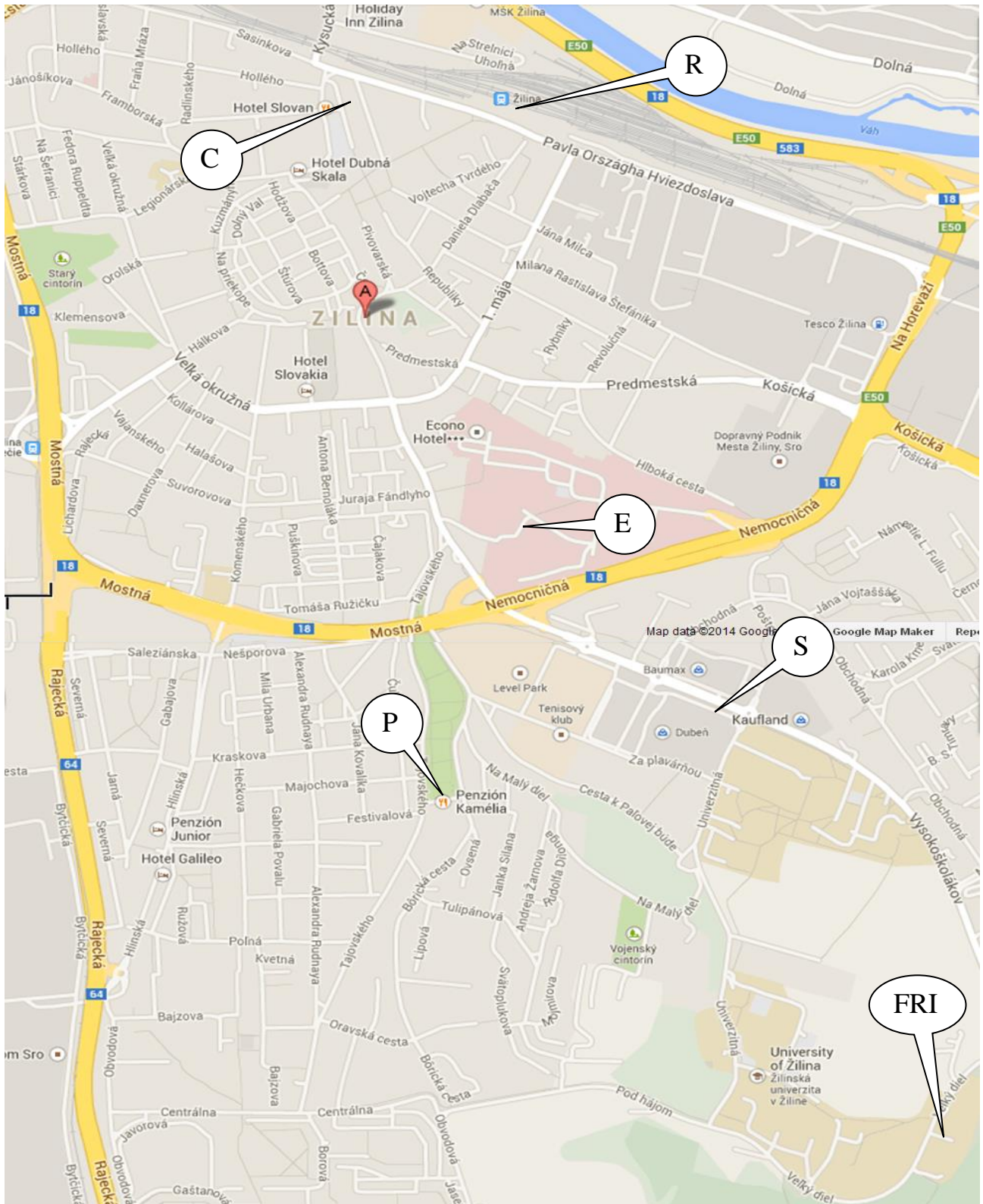
After the death of Erzsébet Czobor, the widow of György Thurzó, the castle became the property of Thurzó's daughters, who entrusted its administration to an elected administrator. Because of changes in politics, society and the economy, the castle gradually lost its important functions. The greatest catastrophe affected the castle in

1800, when a gigantic fire destroyed all the wooden parts of the castle. Some objects from the Lower Castle were recovered after the fire because they had been covered by the shingles. However, the objects from the Middle and Upper Castle were not reconstructed until 1861.

To find a use for the historical object, Ödön Zichy, the administrator of the property (Kompossessorat), organized a foundation which had the aim of founding a regional museum of Orava. The first exhibition took place at the Thurzo Palace in 1868. Nowadays, the Orava Museum is one of the oldest in Slovakia. Its most attractive expositions are those of the Castle Chapel, the Knights' Room, and several rooms with period-style furnishing. Further highlights include the Painting Gallery, the Weapon room, and the scientific, ethnographic and archaeological collections.



Map of Žilina



C – Hotel Center Park, Hotel Slovan

A – Historical centrum of the city

E – Garni Hotel Econo

R – Railway station (near auto station)

P – Penzion Camelia

S – Shops Carrefour and Kaufland;

FRI - Information Sciences and Management Faculty;

Distances between (A and R) or (E and S) near 10 minutes by foot.

Distance between S and FRI near 10-15 minutes by foot.

Distance between P and FRI near 15-20 minutes by foot