

XLVIII INTERNATIONAL SCIENTIFIC CONFERENCE ON  
INFORMATION, COMMUNICATION  
AND ENERGY SYSTEMS AND TECHNOLOGIES



26 - 29 June 2013, Ohrid, Macedonia



Proceedings of Papers

---

---

VOLUME 1

---

---

Bitola, 2013

**XLVIII INTERNATIONAL SCIENTIFIC CONFERENCE ON INFORMATION,  
COMMUNICATION AND ENERGY SYSTEMS AND TECHNOLOGIES**

**- ICEST 2013 -**

**Proceedings of Papers - Volume 1 of 2 volumes**

**Editor: Prof.Dr. Cvetko Mitrovski**

**Technical Editor: Jove Pargovski**

**Published by: Faculty of Technical Sciences - Bitola**

**Printed by: OFFICE 1 - BITOLA**

**Print run: 50**

**ISBN: 978-9989-786-90-7**

CIP - Каталогизација во публикација  
Национална и универзитетска библиотека "Св. Климент Охридски", Скопје

004(062)  
620.9(062)  
621.3(062)

XLV International Scientific Conference on Information,  
Communication and Energy Systems and Technologies (45 ; 2010 ; Ohrid)  
ICEST 2013 : proceedings of papers / XLVIII International  
Scientific Conference on information, communication and energy  
systems and technologies, 26-29 Juni, Ohrid, Macedonia ; [editor  
Cvetko Mitrovski]. - Bitola : Faculty of Technical Sciences, 2013. -  
2 св. (862 стр.) : илустр. ; 30 см

Фусноти кон текстот. - Библиографија кон трудовите. - Регистри

ISBN 978-9989-786-90-7 (вол. И)  
ISBN 978-9989-786-89-1 (вол. ИИ)  
1. Mitrovski, Cvetko [уредник]  
а) Информатика - Собири б) Енергетика - Собири в) Електротехника -  
Собири  
COBISS.MK-ID 94746890

---

---

## TECHNICAL PROGRAM COMMITTEE

---

---

### GENERAL CHAIRMAN:

Mitrovski C., University "St. Kliment Ohridski" Bitola, Macedonia

### VICE CHAIRMEN:

Milovanović B., University of Niš, Serbia

Arnaudov R., Technical University of Sofia, Bulgaria

### MEMBERS OF 2013 PROGRAM COMMITTEE

University "St. Kliment Ohridski" Bitola, Macedonia

Acevski N., Ceselkoska V., Jolevski I., Kostov M., Markovski A., Mitrevski P., Nedelkovski I., Radevska P., Stefanovski M., Trpezanovski Lj.

### Technical University of Sofia, Bulgaria

Atanasov I., Bekiarski Al., Boumbarov O., Demirev V., Dinov R., Dimitrov D., Dimitrov K., Dobrev D., Dochev I., Georgieva V., Iliev G., Iliev I., Jordanova L., Kounchev R., Marinova G., Mirchev S., Miletiev R., Mitsev Ts., Nikolov T., Nikolova B., Nikolova Zl., Pencheva E., Pleshkova Sn., Pankov B., Popova A., Poulkov Vl., Raikovska L., Stoianov G., Tsankov B., Tsenov A., Uzunov I.,

### University of Niš, Serbia

Dončov N., Janković D., Janković N., Jeftić M., Marković V., Perić Z., Stanković R., Stanković Z., Stefanović M., Stojčev M., Stojmenov L., Tasić D.

### St. Cyril and St. Methodius University of Veliko Tarnovo, Bulgaria

Todorov G., Todorova M.,

### Plovdiv University "Paisii Hilendarski", Bulgaria

Eftimov T.

### University of Ottawa, Canada

Bock W.

### Technical University of Byalistok, Poland

Makal J.

### University of Hyogo, Japan

Nakamatsu K.

### NOVA-University, Lisbon, Portugal

Valtchev S.

### Brookes University Oxford, UK

Zieleznik L.

### University of Arkansas at Little Rock, USA

Milanova M

---

---

## ORGANIZING COMMITTEE

---

---

Ceselkoska V., University "St. Kliment Ohridski" Bitola, Macedonia  
Dimitrijević T., University of Niš, Serbia  
Dimitrov K., Technical University of Sofia, Bulgaria  
Dochev I., Technical University of Sofia, Bulgaria  
Goleva R., Technical University of Sofia, Bulgaria  
Iliev G., Technical University of Sofia, Bulgaria  
Koleva P., Technical University of Sofia, Bulgaria  
Kostov M., University "St. Kliment Ohridski" Bitola, Macedonia  
Milijić M., University of Niš, Serbia  
Petkovski M., University "St. Kliment Ohridski" Bitola, Macedonia  
Stanković Z., University of Niš, Serbia  
Tsankova J., Technical University of Sofia, Bulgaria

---

---

## CORRESPONDENCE

---

---

### Conference Chairman:

**Prof. Dr. Mitrovski Cvetko**  
Faculty of Technical Sciences  
Ivo Lola Ribar bb, 7000 Bitola, Macedonia  
phone: +389 47 207 711  
e-mail: cvetko.mitrovski@uklo.edu.mk

### Organizing Committee Chairman:

**Prof. Dr. Mitrevski Pece**  
Faculty of Technical Sciences  
Ivo Lola Ribar bb, 7000 Bitola, Macedonia  
phone: +389 47 207 149  
fax: +389 47 203 370  
e-mail: pece.mitrevski@uklo.edu.mk

### Local Coordinator:

**MSc. Pargovski Jove**  
Faculty of Technical Sciences  
Ivo Lola Ribar bb, 7000 Bitola, Macedonia  
phone: +389 75 314 882  
fax: +389 47 203 370  
e-mail: jove.pargovski@uklo.edu.mk

---

---

## UPDATED INFORMATION

---

---

Updated information can be obtained from the official  
Conference web site:

<http://www.icestconf.org>

---

---

# TABLE OF CONTENTS

---

---

## VOLUME 1

---

---

<b>PLENARY SESSION - Paraconsistent Annotated Logic Program and its Application to Intelligent Control .....</b>	<b>23</b>
Kazumi Nakamatsu	

### Radio Communications, Microwaves, Antennas

<b>1. Investigation of Second and Third Order Distortions Influence in the CATV/HFC .....</b>	<b>33</b>
Oleg Panagiev	
<b>2. Experimental study on availability of FSO system under a heavy snowfall .....</b>	<b>37</b>
Nikolay Kolev and Tsvetan Mitsev	
<b>3. Design of Cross Coupled Meander Folded Hairpin Resonator Filters .....</b>	<b>41</b>
Marin Nedelchev	
<b>4. For certain problems with DVB-T reception .....</b>	<b>45</b>
Oleg Panagiev	
<b>5. Comparative Performance Studies of Laboratory WPA IEEE 802.11b,g Point-to-Multipoint Links .....</b>	<b>49</b>
José A. R. Pacheco de Carvalho, Cláudia F. F. P. Ribeiro Pacheco, Hugo Veiga, António D. Reis	
<b>6. Two-way Doherty amplifier – asymmetry analysis and linearization .....</b>	<b>53</b>
Aleksandar Atanasković, Kurt Blau, Nataša Maleš-Ilić, Aleksandra Đorić	
<b>7. Environmental wireless sensor node .....</b>	<b>57</b>
Vladimir Smiljaković, Siniša Randić, Uroš Pešović	
<b>8. Effectiveness of Reed-Solomon and Convolutional Codes used in Digital Video Broadcasting....</b>	<b>61</b>
Lidia Jordanova, Lyubomir Laskov and Dobri Dobrev	
<b>9. Linearization of microwave power amplifier for broadband applications .....</b>	<b>65</b>
Aleksandra Đorić, Aleksandar Atanasković, Nataša Maleš-Ilić, Bratislav Milovanović	
<b>10. Modelling of a Coaxially Loaded Probe-Coupled Cylindrical Cavity using the Cylindrical TLM Method .....</b>	<b>69</b>
Tijana Dimitrijević, Jugoslav Joković, Bratislav Milovanović	
<b>11. Analysis of Electromagnetic Emissions from Printed Circuit Board in Enclosure Using TLM Method .....</b>	<b>73</b>
Jugoslav Joković, Nebojša Dončov and Tijana Dimitrijević	

### Telecommunication Systems and Technology

<b>1. The level crossing rate of the ratio of product of two <math>k</math>-<math>\mu</math> random variables and <math>k</math>-<math>\mu</math> random variable .....</b>	<b>79</b>
Časlav Stefanović, Danijel Đošić, Dušan Stefanović, Miloš Perić, Mihajlo Stefanović, Srđan Maričić	
<b>2. Second order statistics of MRC receiver over <math>\alpha</math>-<math>\mu</math> multipath fading channels .....</b>	<b>83</b>
Danijel Đošić, Časlav Stefanović, Stefan Panić, Nataša Kontrec, Petar Spalević, Negovan Stamenković	
<b>3. Development of Mobile Backhaul and Transport Demands .....</b>	<b>87</b>
Maja Kukulovska and Liljana Gavrilovska	

<b>4.Active Time-slot Extension in Wireless Sensor Networks.....</b>	<b>91</b>
Mirko Kosanovic, Mile Stojcev	
<b>5.Modeling and Analyzing LTE Networks with EstiNet Network Simulator and Emulator.....</b>	<b>95</b>
Stojan Kitanov and Toni Janevski	
<b>6.BER Performance of IM/DD FSO System with PIN Photodiode Receiver over Gamma-Gamma Atmospheric Turbulence Channel.....</b>	<b>99</b>
Milica Petković, Nemanja Zdravković, Bata Vasić and Goran Đorđević	
<b>7.Preemptive and Non-preemptive Service of IoT Traffic Flows .....</b>	<b>103</b>
Dimitar Atamian and Boris Tsankov	
<b>8.Carrier Frequency Offset Problem Solving in the OFDM/MDPSK System .....</b>	<b>107</b>
Slavimir Stošović, Nenad Milošević, Bojan Dimitrijević and Zorica Nikolić	
<b>9.Overview of current trends in IPTV related FP7 projects.....</b>	<b>111</b>
Biljana Veselinovska, Marjan Gusev, Toni Janevski	

## Signal Processing

<b>1.Dynamic compensation of the gyroscope bias offset.....</b>	<b>117</b>
Rosen Miletiev, Radostin Kenov, Ivaylo Simeonov, Emil Iontchev	
<b>2.Simulation of Codec for Adaptive Delta Modulation .....</b>	<b>121</b>
Rumen Mironov	
<b>3.Omnidirectional Sound Sources for Usage in a Small Anechoic Chamber .....</b>	<b>125</b>
Dejan Ćirić, Marko Janković and Aleksandar Pantić	
<b>4.Practical realization and analysis of shotgun microphone prototype .....</b>	<b>129</b>
Marko Janković, Dejan Ćirić and Marko Stamenković	
<b>5.EEG Sleep Spindles Identification Using Empirical Mode Decomposition and Morphological Operations .....</b>	<b>133</b>
Yuliyana Velchev, Deyan Milev and Kalin Dimitrov	
<b>6.A Wavelet Based Approach for K-complexes Identification for Automated EEG Sleep Staging</b>	<b>137</b>
Deyan Milev, Yuliyana Velchev and Kalin Dimitrov	
<b>7.Inharmonicity of Two-Tones In Contra Octave of Upright Piano .....</b>	<b>141</b>
Zoran Milivojević, Milena Rajković and Dragan Milosavljević	
<b>8.Tempo Map Retrieval from the MIDI Clock Stream .....</b>	<b>145</b>
Lutshayzar Gueorguieff and Peter Antonov	
<b>9.Customization of software for sound insulation prediction in buildings to national legislations – Case study: Slovenia .....</b>	<b>149</b>
Dražko Mašović, Nikola Arsić, Dragana Šumarac Pavlović and Miomir Mijić	
<b>10.The influence of less available physical parameters on the sound insulation calculation according to EN 12354.....</b>	<b>153</b>
Dražko Mašović, Dragana Šumarac Pavlović and Miomir Mijić	

## Digital Image Processing

<b>1.Content-Based Facial Image Retrieval Using SIFT Descriptor with Reduced Number of Matched Keypoints.....</b>	<b>159</b>
Nikolay Neshov	
<b>2.Text Extraction from Complex Background Images.....</b>	<b>161</b>
Nikolay Neshov, Ivo Draganov, Darko Brodic	
<b>3.Estimation of the Global and Local Text Skew in the Old Printed Documents .....</b>	<b>165</b>
Darko Brodić, Ivo Draganov, Dragan Milivojević, Viša Tasić	

<b>4.New and advantageous approach for lossless compression of computer tomography image sequences .....</b>	<b>169</b>
Peter Ivanov, Agata Manolova, Roumen Kountchev	

## Computer Systems and Internet Technologies

<b>1.Comparison of Open Source Cloud Platforms.....</b>	<b>175</b>
Aleksandar Donevski, Sasko Ristov and Marjan Gusev	
<b>2.Interactive Environment for Solving Multiple Objective Programming Problems GENS-IM ....</b>	<b>179</b>
Leonid Kirilov, Krasimira Genova, Vassil Guliashki and Peter Zhivkov	
<b>3.Managing Risk In Transmission System With Implemented Service Oriented Arhitecture .....</b>	<b>183</b>
Nevenka Kiteva Rogleva, Vladimir Trajkovik, Vangel Fustik, Atanas Iliev and Dimitar Dimitrov	
<b>4.Performance Analysis of Different Queuing Scheduling Disciplines for Internet Applications ...</b>	<b>187</b>
Sarhan M. Musa, Mahamadou Tembely, Matthew N. O. Sadiku, and J. D. Oliver	
<b>5.A study of open source PKI systems applicable into INDECT project.....</b>	<b>191</b>
Nikolai Stoianov and Emil Altimirski	
<b>6.Implementation of the Objects Queue of 20 elements for the File Cabinet Memory Method .....</b>	<b>195</b>
Vladimir Stankovic and Kristina Stanisavljevic	
<b>7.Implementation of Parallel LFSR for BIST .....</b>	<b>199</b>
M. K. Stojčev, I. Ž. Milovanović, E. I. Milovanović, T. R. Nikolić	
<b>8.Improving performance of geospatial data processing using OpenMP .....</b>	<b>203</b>
Natalija Stojanović, Dragan Stojanović	
<b>9.Acquiring Performability Metrics of e-Commerce Systems .....</b>	<b>207</b>
Pece Mitrevski and Ilija Hristoski	
<b>10.Web Services Performance on Commercial Virtual Environment (VMware ESX) .....</b>	<b>211</b>
Goran Velkoski, Sasko Ristov and Marjan Gusev	
<b>11.Using Petri Nets to Capture Search Behavior Patterns in the Context of Query Reformulation .....</b>	<b>215</b>
Vesna Gega and Pece Mitrevski	
<b>12.Dataflow Computing: Trend in HPC .....</b>	<b>219</b>
Nenad Anchev, Blagoj Atanasovski, Sasko Ristov and Marjan Gusev	
<b>13.QoS Routing Models in Mobile Applications that Implement Ad-Hoc Networking.....</b>	<b>223</b>
Trajche Kocev, Pece Mitrevski and Tome Dimovski	
<b>14.Cloud Solutions for Bug Reporting .....</b>	<b>227</b>
Pano Gushev, Ana Guseva, Sasko Ristov and Marjan Gusev	
<b>15.Optimization of DC/AC inverter driving.....</b>	<b>231</b>
Goran Nikolić, Tatjana Nikolić, Branislav Petrović and Mile Stojčev	
<b>16.A 900 MHz Self-Tunable Narrowband Low-Noise Amplifier.....</b>	<b>235</b>
Goran Jovanovic, Darko Mitić, Mile Stojcev and Tatjana Nikolic	

## Informatics and Computer Science

<b>1.Evaluation of smartphone capabilities for efficient physical activity recognition.....</b>	<b>241</b>
Nikola Jajac, Bratislav Predic and Dragan Stojanovic	
<b>2.A Method for Estimation Camera Georeference in GIS-based Video Surveillance .....</b>	<b>245</b>
Aleksandar Milosavljević, Dejan Rančić and Aleksandar Dimitrijević	
<b>3.Computation of Best Fixed Polarity Reed-Muller Transform on Multicore CPU Platform.....</b>	<b>249</b>
Miloš Radmanović	
<b>4.Hybrid Evolutionary Algorithm for Integer Multiple-Objective Optimization Problems.....</b>	<b>253</b>
Vassil Guliashki, Krasimira Genova, Leoneed Kirilov	

<b>5.Reasoning-enabled Semantic E-Learning Approach.....</b>	<b>257</b>
Martin Jovanović and Dejan Todosijević	
<b>6.Efficient Parallel Computation of the Galois Field Expressions for Ternary Logic Functions ....</b>	<b>261</b>
Dušan Gajić and Radomir Stanković	
<b>7.Calculation and Visualization of Electromagnetic Field Strength Estimate using Real Terrain Model .....</b>	<b>265</b>
Vladan Mihajlović, Marko Kovačević, Aleksandar Milosavljević and Dejan Rančić	
<b>8.Solving Kakuro puzzle – comparison of deterministic approaches.....</b>	<b>269</b>
Stojanche Panov and Saso Koceski	
<b>9.Cache Misses Challenge to Modern Processor Architectures.....</b>	<b>273</b>
Milco Prisaganec and Pece Mitrevski	
<b>10.Machine Learning Based Classification of Multitenant Configurations in the Cloud.....</b>	<b>277</b>
Monika Simjanoska, Goran Velkoski, Sasko Ristov and Marjan Gusev	
<b>11.Buffer Management in High-performance Routers.....</b>	<b>281</b>
Dragi Kimovski and Atanas Hristov	

## Electronics

<b>1.VHDL-AMS Description of Digitally Programmable Gain Amplifiers through SPI .....</b>	<b>287</b>
Marieta Kovacheva and Ivailo Pandiev	
<b>2.Concurrent X-fault simulator – problems and decision .....</b>	<b>291</b>
Pavlinka Radoyska and Kamen Fillyov	
<b>3. Design of GPS-based Wild Animal’s Tracking System with Reduced Size and Weight .....</b>	<b>295</b>
Eltimir Stoimenov, Tsvetan Shoshkov, Rosen Miletiev, Ivailo Pandiev	
<b>4.Finite Element Analysis for Multiconductor in Non-Homogenous Multilayered Dielectric Media .....</b>	<b>299</b>
Sarhan M. Musa, Matthew N. O. Sadiku, and J. D. Oliver	
<b>5.Computer-Aided Parameter Extraction of Behavioral RF Inductor Models.....</b>	<b>303</b>
Elissaveta Gadjeva	
<b>6.Effectiveness of the Verilog-A Noise Macromodel of Current Feedback Operational Amplifier</b>	<b>307</b>
Georgi Valkov and Elissaveta Gadjeva	

## Energy Systems and Efficiency

<b>1.Optimal experiment for determination of the thermo physical properties on materials with low thermal conductivity.....</b>	<b>313</b>
Zore Angelevski, Cvete Dimitrieska, Silvana Angelevska and Ivo Kuzmanov	
<b>2.Daily Optimal Operation of Cascade Hydro Power Plants With Small Storage Capacities.....</b>	<b>317</b>
Anton Causevski and Sofija Nikolova-Poceva	
<b>3.Distributed Renewable Energy and Conviviality.....</b>	<b>321</b>
Aleksandar Malecic	
<b>4.Probabilistic Assessment of the Impact of Renewable Energy Sources on the Power Flows of Medium Voltage Grids.....</b>	<b>325</b>
Nikolay Nikolaev	
<b>5.Optimal Modules Deployment in Large-Scale Photovoltaic Plants.....</b>	<b>329</b>
Dimitar Dimitrov, Atanas Iliev and Nevenka Kiteva Rogleva	
<b>6.Benefits of 6 kV Smart Grid Implementation in Open Cast Coal Mine Suvodol - REK Bitola....</b>	<b>333</b>
Ljupco Trpezanovski and Jove Gjorgijovski	
<b>7.Analysis of the Grounding System of the Thermal Power Plant Oslomej .....</b>	<b>337</b>
Nikolce Acevski, Elena Stojkoska	



<b>8.The State of Renewable Electricity – Worldwide, in EU and in R.Macedonia.....</b>	<b>341</b>
Gordana Janevska	

## Control Systems

<b>1.Analyzing the number and the nature of the injuries in a industrial system from Bitola, R. Macedonia .....</b>	<b>347</b>
Ivo Kuzmanov, Silvana Angelevska and Zore Angelevski	
<b>2.Trajectory Tracking Control for the Slew Motion of a Dragline Excavator .....</b>	<b>351</b>
Rosen Mitrev and Plamen Petrov	
<b>3.Global path planning algorithm for mobile robots.....</b>	<b>355</b>
Stojanche Panov and Saso Koceski	
<b>4.Efficient RF voltage transformer with bandpass filter characteristics .....</b>	<b>359</b>
M.Moreira, J.Bjurström, I.Katardjiev and V.Yantchev	
<b>5.Dynamic Models for Induction Motor Drives for Heavy Duty Regimes.....</b>	<b>361</b>
Dragan Vidanovski and Slobodan Mirčevski	

## Measurement Science and Technology

<b>1.Investigation of Memory Effect by Measurement of Time Delay of Electrical Breakdown in Commercial Gas-filled Surge Arresters.....</b>	<b>367</b>
Momčilo Pejović, Nikola Nešić, Milić Pejović and Nataša Bogdanović	
<b>2.Smart sensor network for ergonomic evaluation of working environment .....</b>	<b>371</b>
Teodora Trifonova, Valentina Markova, Ventseslav Draganov, Krasimira Angelova and Vasil Dimitrov	
<b>3.Measurements and Test Performance for Integrated Digital Loop Carrier for White Noise Impairment with Fast Mode .....</b>	<b>375</b>
Sarhan M. Musa, Mohammed A. Shayib, Matthew N. O. Sadiku and J. D. Oliver	
<b>4.Testing Procedure applied to Virtual Instrument for Analysis of the Power Quality Disturbances.....</b>	<b>379</b>
Milan Simić, Dragan Živanović, Dragan Denić and Goran Miljković	
<b>5.Improved Pseudorandom Absolute Position Encoder.....</b>	<b>383</b>
Goran Miljković, Dragan Denić, Milan Simić, Aleksandar Jocić, Jelena Lukić	

## Engineering Education

<b>1.Trends in Increasing the Channel Capacity of FSO Systems .....</b>	<b>389</b>
Yordan Kovachev and Tsvetan Mitsev	
<b>2.A New Curriculum Design for an Engineer-Constructor Study Program .....</b>	<b>393</b>
Tale Geramitcioski, Cvetanka Mitrevska, Vangelce Mitrevski and Pece Mitrevski	

## Poster 1 - Radio Communications, Microwaves, Antennas

<b>1.Topologies of Wireless Sensor Networks .....</b>	<b>399</b>
Zlatan Ganev	
<b>2.QWS Surge Protectors Testing Using Random High-Voltage Pulses Modeling .....</b>	<b>403</b>
Kliment Angelov and Miroslav Gechev	
<b>3.Impact of Laser Beam Divergence on Power Design of Free Space Optics Communication Systems .....</b>	<b>407</b>
Boncho Bonev	

<b>4.Methods of Coordinates Determination in Wireless Sensor Networks .....</b>	<b>409</b>
Zlatan Ganev	
<b>5.Statistical study of dispersion properties of the CATV reverse channel.....</b>	<b>413</b>
Ilija Iliev and Marin Nedelchev	
<b>6.System for monitoring and management of energy efficiency in public buildings .....</b>	<b>417</b>
Emil Altimirski, Nicola Kaloyanov, Plamen Vichev, Veselin Plamenov	
<b>7.Methods for Determination of Coordinates in Two-Dimensional Navigation System by Measuring the Delay of the Signal.....</b>	<b>421</b>
Emil Altimirski, Petko Simeonov	
<b>8.Efficient Neural Model for Estimation of the Microwave Antenna Noise Temperature.....</b>	<b>425</b>
Ivan Milovanovic, Zoran Stankovic, Marija Agatonovic and Marija Milijic	
<b>9.2D DOA Estimation of Two Coherent Sources based on RBF Neural Networks .....</b>	<b>429</b>
Marija Agatonovic, Zoran Stankovic, Bratislav Milovanovic, Ivan Milovanovic and Nebojsa Doncov	
<b>10.Statistical analysis of multiple reflections in single mode waveguides .....</b>	<b>433</b>
András Fehér and Szilvia Nagy	
<b>AUTHOR INDEX .....</b>	<b>437</b>

## VOLUME 2

### Poster 2 - Telecommunications Systems and Technology

<b>1.Investigate common work of IP software phone systems and PSTN equipment.....</b>	<b>455</b>
Todorka Georgieva and Borislav Necov	
<b>2.Integration of optical and wireless networks under the Radio-over-Fiber concept.....</b>	<b>459</b>
Suzana Miladic	
<b>3.Optical Line Terminal Process modeling.....</b>	<b>463</b>
Stela Kostadinova and Rozalina Dimova	
<b>4.Development of algorithm and simulation program for audio and video information quality estimation in multimedia systems.....</b>	<b>467</b>
Kalina Peeva, Aleksander Bekiarski and Snejana Pleshkova	
<b>5.Comparative Analysis of Modern Wireless Communication Systems Relevant to Smart Metering .....</b>	<b>471</b>
Mariana Shotova, Georgi Nikolov and Vencislav Valchev	
<b>6.Mobile Wireless Sensor Networks Localization .....</b>	<b>475</b>
Vasil Dimitrov, Rozalina Dimova and Teodora Trifonova	
<b>7.Laboratory SCADA – System for Control on Railway Traffic.....</b>	<b>479</b>
Emiliya Dimitrova	
<b>8.Channel Capacity of Dual SC Diversity System Based on Desired Signal Decision Algorithm in Microcell.....</b>	<b>483</b>
Aleksandra Panajotović, Mihajlo Stefanović, Dragan Drača and Nikola Sekulović	
<b>9.Simulation of Effects of Group Velocity Dispersion on Gaussian Pulse Propagation through Optical Fiber .....</b>	<b>487</b>
Petar Spalević, Branimir Jakšić, Aleksandar Marković, Zoran Todorović and Vladislav Simić	
<b>10.Algorithm for modular exponentiation in public key cryptosystems.....</b>	<b>491</b>
Plamen Stoianov	
<b>11.Energy Efficient Add/Drop Approach for Heterogeneous Networks.....</b>	<b>495</b>
Oleg Asenov, Pavlina Koleva, Vladimir Poulkov	

## Poster 3 - Signal Processing

<b>1.A Variational Approach of Optimization the Signal Form in the Radio Communication Systems .....</b>	<b>501</b>
Galina Cherneva, Elena Dimkina	
<b>2.Synchronization in Radio Communication Systems with Pseudo Random Restructuring Operation.....</b>	<b>503</b>
Antonio Andonov and Filip Iliev	
<b>3.The Reduction of Rotating Element Noise Using Active Noise Control.....</b>	<b>505</b>
Zoran Milivojević and Violeta Stojanović	
<b>4.Investigation of second-order digital filter structures having low sensitivity to parasitic effects. ....</b>	<b>509</b>
Maria Nenova	

## Poster 4 - Computer Systems and Internet Technologies

<b>1.A Methodology of Developing Interoperable Electronic Business in the Transport Sector.....</b>	<b>515</b>
Slađana Janković, Snežana Mladenović, Marko Vasiljević, Irina Branović, Slavko Vesković	
<b>2.Recommendation in E-Learning Based On Learning Style .....</b>	<b>519</b>
Aleksandar Kotevski, Gjorgi Mikarovski and Ivo Kuzmanov	
<b>3.Analysis and Classification of Robot Control Algorithms .....</b>	<b>523</b>
Maya Todorova	
<b>4.Elaboration of Internet of Things Security Functional Model .....</b>	<b>527</b>
Evelina Pencheva	
<b>5.Internet of Things in Healthcare Applications.....</b>	<b>531</b>
Evelina Pencheva, Ivaylo Atanasov, Raycho Dobrev	
<b>6.Determining the importance of the usability attributes of Web-based GIS applications.....</b>	<b>535</b>
Nebojša Djordjević, Dejan Rančić	
<b>7.Implementation of LMS in the Education in the Field of Programming .....</b>	<b>539</b>
Niko Naka, Snezana Savoska and Josif Petrovski	
<b>8.Adaptive vs. Non-adaptive e-Learning Systems – a Petri Net-based Evaluation Approach .....</b>	<b>543</b>
Emilija Spasova Kamceva and Pece Mitrevski	
<b>9.Content Management Systems – Unleashed Possibilities .....</b>	<b>547</b>
Jove Jankulovski, Mimoza Anastoska-Jankulovska and Pece Mitrevski	
<b>10.Appropriate Learning Tools and Approaches According to the Different Learning Styles and Collaboration Skills of the Students.....</b>	<b>551</b>
Donika Valcheva and Margarita Todorova	
<b>11.Optimal Design of Elements in Confirmation of Panel Buildings .....</b>	<b>555</b>
Vassil Guliashki, Chavdar Korsemov, Hristo Toshev, Leoneed Kirilov and Krassimira Genova	
<b>12.Modification of Algorithms to Control of Mobile Object.....</b>	<b>559</b>
Maya Todorova	
<b>13.Creating a virtual reality application from Memorial Museum “11th October” – Prilep .....</b>	<b>563</b>
Boban Mircheski, Igor Nedelkovski, Aleksandra Lozanovska and Jove Pargovski	
<b>14.Improved Data Transfer for Wireless Meteorological Stations.....</b>	<b>567</b>
Orlin Stanchev, Emilian Bekov and Vencislav Valchev	
<b>15.Interoperability of Cloud and Mobile Services .....</b>	<b>571</b>
Aleksandar Bahtovski and Marjan Gusev	

## Poster 5 - Digital Image Processing

<b>1.Adaptive Vision System.....</b>	<b>577</b>
Rosen Spirov and Neli Grancharova	
<b>2.An Approach for Position Detection of Industrial Objects .....</b>	<b>581</b>
Veska Georgieva and Plamen Petrov	
<b>3.Approaches for Texture Image Creation.....</b>	<b>585</b>
Daniela Ilieva	
<b>4.Coding of a Video with the Inserted Watermark using H.264/AVC Coder .....</b>	<b>589</b>
Zoran Veličković and Zoran Milivojević	
<b>5.3D Modelling from video.....</b>	<b>593</b>
Svetlana Mijakovska, Igor Nedelkovski	
<b>6.Automated Vegetation Classification for LANDSAT 7 Multispectral Images .....</b>	<b>597</b>
Dragan Stevic, Igor Hut, Nikola Dojčinović and Jugoslav Joković	

## Poster 6 - Informatics and Computer Science

<b>1.Numerical Experiments for the Study of the Influence of Wavelength in Laser Impact onto Metals and Alloys.....</b>	<b>603</b>
Nikolay Angelov	
<b>2.Similarity search in text data for Serbian language.....</b>	<b>607</b>
Ulfeta Marovac, Adela Crnisanin, Aldina Pljaskovic, Ejub Kajan	
<b>3.Optimization of Vehicle Maintenance Concept Using Simulation .....</b>	<b>611</b>
Ivan Djokic, Ljubomir Lazic, Aldina Pljaskovic, Aleksandra Pavlovic	
<b>4.Use of genetic algorithms for optimal design of electrical resistive furnaces insulation.....</b>	<b>615</b>
Hristo Nenov and Borislav Dimitrov	
<b>5.Communications in Realized Industrial Computer Networks.....</b>	<b>619</b>
Viša Tasić, Dragan R.Milivojević, Vladimir Despotović, Darko Brodić, Marijana Pavlov, Ivana Stojković	
<b>6.Information technology to calculate energy savings using solar panels and home appliances .....</b>	<b>623</b>
Nanko Bozukov, Tanya Titova and Veselin Nachev	
<b>7.Using Dashboards as tools to improve the process of decision making in heathcare.....</b>	<b>625</b>
Jasmina Nedelkoska, Snezana Savoska and Emilija Taleska	
<b>8.Preparation of data for visualization using SQL Server 2008 .....</b>	<b>629</b>
Emilija Taleska, Snezana Savoska, Jasmina Nedelkoska	
<b>9.Statistical parameters of the first order for Rayleigh Fading with EGC Diversity combiner using MATLAB.....</b>	<b>633</b>
Borivoje Milosevic, Mihajlo Stefanovic, Slobodan Obradovic and Srdjan Jovković	
<b>10.Expert systems for managing asbestos in premises .....</b>	<b>637</b>
Igor Nedelkovski, Boban Mircheski and Aleksandra Lozanovska	
<b>11. Ontology-based Personalization and Recommender System in Digital Libraries .....</b>	<b>641</b>
Daniela Kjurchievska	

## Poster 7 - Electronics

<b>1.Autonomous Inverters With Energy Dosing For Ultrasonic Applications .....</b>	<b>647</b>
Nikolay Dimitrov Madzharov	
<b>2.Virtual System for Magnetic Field Measurement.....</b>	<b>651</b>
Nikola Draganov, Totka Draganova, Anatolii Aleksandrov	

<b>3. Based on AMR Sensor Device for Contactless Measurement of AC Current</b> .....	<b>655</b>
Nikola Draganov	
<b>4. Design and Signal Processing Techniques on 0.18µm CMOS Hall Microsensors</b> .....	<b>659</b>
Tihomir Takov, Ivelina Cholakova and Yavor Georgiev	
<b>5. Investigation of the Defects Formation in Flexible Organic Light Emitting Devices by Thermal Activated Currents</b> .....	<b>663</b>
Mariya Aleksandrova	
<b>6. Incremental Encoder Macromodel for Educational Purpose</b> .....	<b>667</b>
Marieta Kovacheva and Peter Yakimov	
<b>7. Electrical Properties of Poly(Vinylidene Fluoride-COHexafluoropropylene) Nanocomposites with Nanoclays</b> .....	<b>671</b>
Pavlik Rahnev, Dimitrina Kiryakova, Lyudmila Borisova and Atanas Atanassov	
<b>8. Metal – Polymer Based Power Bulk Resistors</b> .....	<b>675</b>
Pavlik Rahnev and Silviya Letskovska	
<b>9. Modeling of high voltage periodically attenuating discharge in liquid with controllable high voltage switch thyatron</b> .....	<b>677</b>
Milena Ivanova and Stefan Barudov	
<b>10. Analysis and Design of Instrumentation Amplifiers</b> .....	<b>681</b>
Ivailo Pandiev	
<b>11. Pspice Simulation of Optoelectronic Circuits of Detectors</b> .....	<b>685</b>
Hristo Sabev and Tsanko Karadzhov	
<b>12. Subtraction Procedure for Removing the Baseline Drift from ECG Signals: Adaptation For Real Time Operation With Programmable Devices</b> .....	<b>687</b>
Tsvetan Shoshkov and Georgy Mihov	
<b>13. Investigation of Thin PZT and ZnO Piezoelectric Layers in Dynamic Mode for Application in MEMS</b> .....	<b>691</b>
Georgi Kolev, Krassimir Denishev, Mariya Aleksandrova and Yordanka Dutsolova	
<b>14. Sputtering of Thin Films on Flexible Substrates</b> .....	<b>695</b>
Pavlik Rahnev, Silviya Letskovska, Dimitar Parachkegov and Kamen Seymenliyski	
<b>15. Design and Realization of a small 10 Watt Forward Converter</b> .....	<b>699</b>
Zoran Zivanovic and Vladimir Smiljakovic	

## Poster 8 - Measurement Science and Technology

<b>1. Vibration Measurement with Piezoelectric Transducer</b> .....	<b>705</b>
Bozhidar Dzhudzhev, Veselka Ivancheva, Silviya Kachulkova and Ekaterina Gospodinova	
<b>2. Examination of capacitive transducers and their use for measurement of small linear displacements</b> .....	<b>709</b>
Veselka Ivancheva, Silvia Kachulkova, Bozhidar Dzhudzhev and Vladislav Slavov	
<b>3. RADFET as a sensor and dosimeter of gamma-ray irradiation</b> .....	<b>713</b>
Milić Pejović, Momčilo Pejović and Nikola Nešić	
<b>4. New approach for designing high-performance controllers in electrical drives systems using Programmable Logic Devices</b> .....	<b>717</b>
Vladimir Karailiev and Valentina Rankovska	

## Poster 9 - Energy Systems and Efficiency

<b>1. Analysis of the Mesh Voltage Calculation Method in the Presence of a Two-Layer Soil</b> .....	<b>723</b>
Marinela Yordanova, Margreta Vasileva and Rositsa Dimitrova	

<b>2.Design, Construction, Calibration and Use of A New Type of Electromagnetic Brake.....</b>	<b>727</b>
Miroslav Bjekic, Milos Bozic, Marko Rosic, Marko Popovic, Dragisa Petkovic	
<b>3.Energy Capability of Metal-Oxide Surge Arresters in Electric Power Lines 20 kV .....</b>	<b>731</b>
Margreta Vasileva and Marinela Yordanova	
<b>4.Model-experiment comparative analysis of roof type photovoltaic generator .....</b>	<b>735</b>
Bohos Aprahamian and Milena Goranova	
<b>5.Renewable Energy Sources and Tariffing of Electrical Power .....</b>	<b>739</b>
Silvija Letskovska and Kamen Seymenliyski	
<b>6.Experimental Verification of Algorithm for Indirect Domestic Load Recognition .....</b>	<b>743</b>
Konstantin Gerasimov, Yulian Rangelov and Nikolay Nikolaev	
<b>7.Functionalities Extension of the NASAVR Software For Small-Signal Stability of Electric Power Systems.....</b>	<b>747</b>
Yulian Rangelov, Konstantin Gerasimov, Yoncho Kamenov and Krum Gerasimov	
<b>8.Mechanical Design of High Voltage Overhead Transmission Lines With Thermal-Resistant Aluminum Alloy Conductors Considering the Heating From The Electrical Current .....</b>	<b>751</b>
Yoncho Kamenov, Yulian Rangelov and Angel Varangov	
<b>9.Optimization of Electric Resistance Furnace Using Backtracking Algorithm .....</b>	<b>755</b>
Borislav Dimitrov, Marinela Yordanova and Hristo Nenov	
<b>10.Heat-accumulation system powered by photovoltaic modules.....</b>	<b>759</b>
Milena Goranova and Bohos Aprahamian	
<b>11.Model Study of the Processes In Current Instrument Transformers For The Purposes of Relay Protection.....</b>	<b>763</b>
Krum Gerasimov, Mediha Hamza, Margreta Vasileva and Anton Filipov	
<b>12.Design of Photovoltaic plant for research purposes in University of Transport – Sofia .....</b>	<b>767</b>
Ivan Milenov and Vasil Dimitrov	
<b>13.Vector Analysis and Comparative Valuation of Precise and Approximate Non-Linear Models of Discrete Regulator with Reducing Input AC Voltage.....</b>	<b>771</b>
Emil Panov, Emil Barudov and Stefan Barudov	
<b>14.LED Technology in public lighting installations – facts or fiction.....</b>	<b>775</b>
Andrej Djuretic, Nebojsa Arsic and Mile Petrovic	
<b>15.Daily Load Curves for Different Months of Commercial Load Excluding Craft Stores and Shops .....</b>	<b>779</b>
Lidija Korunovic and Marko Vuckovic	
<b>16.Electromagnetic field analysis on salient poles synchronous motor in 3D.....</b>	<b>783</b>
Blagoja Arapinoski, Mirka Popnikolova Radevska, Milan Cundev, Vesna Ceselkoska	
<b>17.Numerical analysis and calculation of parameters of Three-Phase Induction Motor with Double Squirrel Cage .....</b>	<b>787</b>
Blagoja Arapinoski, Milan Cundev and Mirka Popnikolova Radevska	

## Poster 10 - Control Systems

<b>1.Development of a system for power supply monitoring and autonomous ignition of gasoline generator.....</b>	<b>793</b>
Goran Goranov and Iskren Kandov	
<b>2.Bondsim Modeling and Simulation of Chaos in Cascade Connected Nonlinear Electrical Systems .....</b>	<b>797</b>
Bojana M. Zlatkovic and Biljana Samardzic	
<b>3.Further results on integer and non-integer order PID control of robotic system .....</b>	<b>801</b>
Mihailo Lazarević, Srećko Batalov, Milan Cajić and Petar Mandić	

<b>4. Investigating the behaviour of the welding manipulator tip .....</b>	<b>805</b>
Svetlana Gerganova-Savova	
<b>5. Neuro-Genetic Algorithm for Non-Destructive Food Quality Determination.....</b>	<b>809</b>
Tanya Titova, Veselin Nachev, Chavdar Damyanov and Nanko Bozukov	
<b>6.11 DoF inertial system for dynamics analysis of moving objects.....</b>	<b>813</b>
Rosen Miletiev, Emil Iontchev, Ivaylo Simeonov, Rumen Yordanov	
<b>7. Principles and Methods of Data Models Creation Within Automated Control Systems.....</b>	<b>817</b>
Zoya Hubenova, Antonio Andonov, Vladimir Gergov	
<b>8. Bond Graph Modelling and Simulation of the 3D Crane System Using Dymola.....</b>	<b>821</b>
Dragan Antić, Dragana Trajković, Saša Nikolić, Staniša Perić and Marko Milojković	
<b>9. Identification of Dynamic Processes with Artificial Neural Networks.....</b>	<b>825</b>
Jordan Badev and Ivan Maslinkov	
<b>10. AGV Guidance System Simulation with Lego Mindstorm NXT and RobotC .....</b>	<b>829</b>
Violeta Kostova, Ramona Markoska and Mitko Kostov	

### Poster 11 - Engineering Education

<b>1. Teaching FPGA-Based CPU Cores and Microcontrollers .....</b>	<b>835</b>
Valentina Rankovska	
<b>2. Interactive Learning Module Implementing "Divide and Search" Procedure in Convolutional Encoders Analysis .....</b>	<b>839</b>
Adriana Borodzhieva, Galia Marinova and Tzvetomir Vassilev	
<b>3. GUI for Properties Measurement of Medical Images.....</b>	<b>843</b>
Veska Georgieva and Olga Valchkova	
<b>4. Realization of flying shear for laboratory experiments .....</b>	<b>847</b>
Božić Miloš, Nebojša Mitrović and Marko Rosić	
<b>5. Curricula Innovation of the Study Program in Environmental Protection Engineering .....</b>	<b>851</b>
Tale Geramitcioski, Vangelce Mitrevski, Ilios Vilos and Pece Mitrevski	
<b>6. English for specific purposes on Cloud Platform.....</b>	<b>855</b>
Danica Milosevic and Borivoje Milosevic	
<b>7. Online simulation of nonlinearity limitations in a single mode optical fiber .....</b>	<b>859</b>
Kalin Dimitrov and Lidia Jordanova	
<b>AUTHOR INDEX.....</b>	<b>861</b>

# Analyzing the number and the nature of the injuries in a industrial system from Bitola, R. Macedonia

Ivo Kuzmanov<sup>1</sup>, Silvana Angelevska<sup>2</sup> and Zore Angelevski<sup>3</sup>

**Abstract** – During the year 2012, a research as a part of the every year activity of the NGO Bitola from Bitola (health and safety organization), considering the number and the nature of the injuries was conducted in Bitola's region. The research was done taking into consideration every single enterprise in Bitola's region (considering the nature and the number of the injuries), and considering the documents from the local inspectors (safety and health). All of the information's gathered were separated in several categories. This paper represents the analysis from FOD Bitola – a local business entity. The analysis was conducted in a frame period January – December 2012, and documents from local safety inspectors were also considered.

**Keywords** – Safety at work places, Work injuries, Safety systems.

## I. INTRODUCTION

Safety on the work places is one of the key aspects that directly lead to motivated staff members, whose feelings as safer as can be in their workplaces, leads directly to maximum motivation and achievement on the defined business objectives. [1] Considering Bitola's region there are numerous enterprises with a total amount of more than 13.000 employees. So the injuries spotted in these enterprises are one of the main aspects for several institutions such as: the local safety inspectors, the NGO Bitola (local safety and health organization), Macedonian labor ministry, etc.

Considering the main activities of the NGO Bitola, where we are active members, the main objective of the association is to educate the enterprises in the field of safety and health on work places, to analyses the number and the nature of the injuries in the Bitola's region on annual base and to have continued efforts in terms of educational and practical advices to business enterprises in the field of occupational safety and health.

The sources that were used to get the relevant information's for these analyses are [2]:

- Submitted evidential sheets given by the business enterprises that gravitates in the Bitola's region

<sup>1</sup>Ivo Kuzmanov is with the Faculty of Technical Science at the University "St. Kliment Ohridski" in Bitola, Ivo Lola Ribar nn, Bitola 7000, Republic Macedonia, E-mail: ivo\_kuzmanov@yahoo.com

<sup>2</sup>Silvana Angelevska is with the Faculty of Technical Science at the University "St. Kliment Ohridski" in Bitola, Ivo Lola Ribar nn, Bitola 7000, Republic Macedonia.

<sup>3</sup>Zore Angelevski is with the Faculty of Technical Science at the University "St. Kliment Ohridski" in Bitola, Ivo Lola Ribar nn, Bitola 7000, Republic Macedonia.

- Submitted records for the number of injuries, given by competent inspectors (safety and health on work places) from Bitola's region.

The basic aim of this paper is to represent all of the injuries spotted in a real business entity in Bitola's region, guttered in the time frame January – December 2012. All of the information's are analyzed in the period January – March 2013, and are divided in several sub – categories (key points of view) represented in addition of this paper.

## II. PRESENTING THE BUSINESS ENTITY AND THE CRITERIA'S THAT WERE UNDER RESEARCH

The business entity that is represented in this paper is FOD Bitola. It is an industrial system from the steel - manufacturing industry, which is active from 1986. At the moment there are 220 full time employees, and several from agencies for temporarily employment. [3] The targets of the research are the 220 employees because all of the records are for them. In the business entity there is a double shift work period (2 shifts / 16 hours total).

All of the results from the conducted research, considering the work injuries on the direct work places, are analyzed and categorized in several key points of view such as [1], [2]:

- the gender of the injured person
- the aimed education of the injured person
- the nature of the injury (death, heavy, light, etc)
- the body part that is injured
- the day of the week (when the injury is spotted)
- the time frame of the day
- the age of the injured person
- the cause of the injury, and
- lost work days (as a result of the spotted injury).

Considering the two sources for information (information from the entity, and information from the local inspectors), I must say that there are 26 spotted and confirmed (by the local inspectors) injuries in the time frame January – December 2012.

In addition of the paper, several of the key points of view, with the final results, are represented.



**III. PRESENTING THE RESULTS FROM THE RESEARCH**

*A. Gender of the injured persons*

Considering the gender of the injured persons the situation is represented into table 1, and in the figure 1.

Table I  
GENDER OF THE INJURED PERSON

Gender	Total number of injured persons	In percent (%)
Male	18	69.2
Female	8	30.8
TOTAL	26	100



Fig. 1. Gender of the injured person

Viewing the results, another sub – criteria is more than relevant, and that is the total percent of injured persons in 2012, considering the total number of employees (220 employees). So dividing the number of injured persons (26) with the total number of employees (220), the total percent of injured persons is 11.8%. That means that every 10-th person in this business entity was injured during the work activities in 2012.

*B. Nature of the injury*

Considering the nature of the injury, all of the injuries were divided into three main categories, such as: death, heavy injury and light injury. Unfortunately all of the injuries (26) were heavy injuries, so the total amount of lost work days as a result of the injury in 2012, were 283 work days. From that amount, 276 work days were directly lost as a result of a spotted injury, and 7 work days were lost as a result of an professional illness.

Furthermore, considering the body part that was injured, there are several main categories of injuries, such as:

- Injury of the head
- Injury of the body

- Injury of the arm
- Injury of the leg

Taking in consideration that the number of the injured persons in FOD Bitola, in the year 2012 was 26 injured persons, before I start the presentation of the results divided in the categories previously mentioned, I must say that several persons (to be more precise – 5 persons), have had multiple injury (for example 1 injury – 2 body parts injured). That is the reason why the total number of injuries in Table 2 and in Figure 2 is 31.

The table 2 and figure 2, are created especially for representation of the results

Table II  
THE BODY PART THAT IS INJURED

Body part	Total number of injuries	In percent (%)
Head	2	6.4
Body	2	6.4
Arm	14	45.1
Leg	13	42.1
TOTAL	31	100

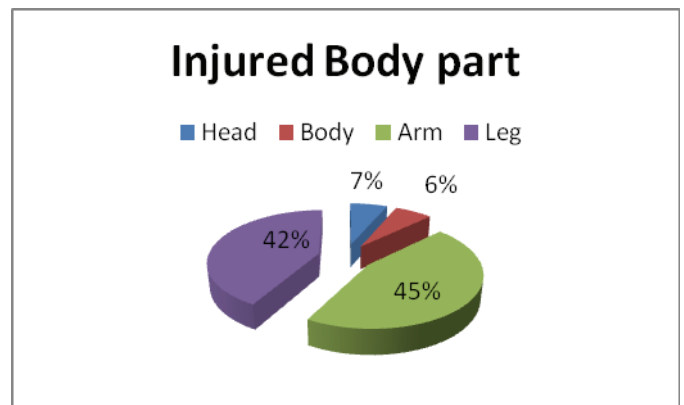


Fig. 2. Injured body part

Seeing the results, arms and legs are the most injured body part. Taking into consideration that the number of injured persons was 26 injured people, every 9-th of 10 people has an injury of the arms or the legs. On the other hand 87% of the body injuries are injuries of the arms and the legs. So, this is one of the main objectives for further analysis, and future steps for safer work places.

*C. Aimed education of the injured person*

Considering the work processes and the level of education that is required for the work position from one hand, and on the other the results from the conducted research and the results about the level of the education aimed, we can conclude that every 26 people has an middle level of education, or in world frame known as secondary school (classification in Macedonia - SSS). But, I must say that the business entity has multiple processes that require this level of

degree and that is the main reason why all of the spotted injuries, to be more precise 26 people, has a middle level degree (secondary school). In all of the business entities that were under consideration during this research the results from these criteria were segmented in several levels such as: primary school, secondary school, university degree, master degree and even a PhD degree.

*D. Day of the week (when the injury is spotted)*

The results from the research were considered from another criterion, and that is the day of the week when the injury is spotted. Considering the processes of production, the business entity work from Monday to Sunday, with shifts. So, all of the spotted injuries considering this criteria, are represented into Table 3 and Figure 3 in addition.

Table III  
DAY OF THE WEEK

Day	Total number of injuries	In percent (%)
Monday	2	7.7
Tuesday	5	19.2
Wednesday	5	19.2
Thursday	7	27.0
Friday	5	19.2
Saturday	0	0.0
Sunday	2	7.7
TOTAL	26	100

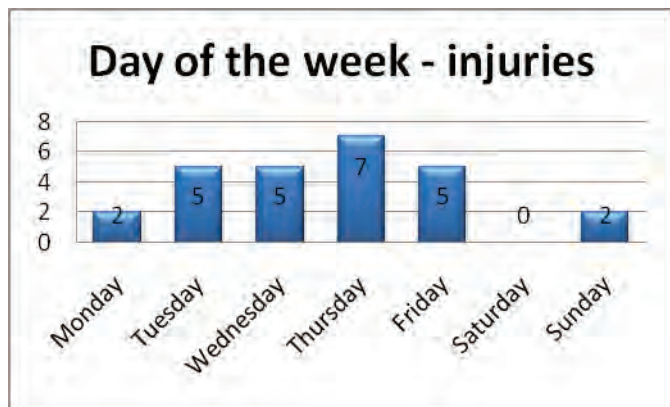


Fig. 3. Injuries in week day

Seeing the results represented in table 3 and figure 3, it is more than obvious that most of the injuries, or to be more precise 22 from 26 total (84.6%) has been spotted in the week frame Tuesday-Friday. But the so-called black day is Thursday with total 7 injuries (or 27%). We can say that every 4-th person from 26 (spotted injured persons) is injured in Thursday.

*E. Age of the injured person*

The age of the injured person is another very relevant factor for injury. Considering numerous foreign authors, at the beginning (when the employee doesn't have any kind of experience) and in the period when the employees are before retirement (60-65 years of age), the risk factor for injury is up to 80-85%. That is why the age of the workers is one of the elements that should be considered during the process of risk evaluation on direct work places.

On the other hand the results from the conducted research are separated in 4 different categories of age, such as:

- 18-25 years of age
- 25-35 years of age
- 35-45 years of age
- 45-65 years of age

The frames 18-64 years of age are taken because of the Macedonian laws. 18 years is considered as an age when persons can start working, and the age of 65 is the age when the person is going to retirement.

All of the results from the research on this point of view are represented in Table 4 and Figure 4 in addition of the paper.

Table IV  
AGE OF THE INJURED PERSON

Age	Total number of injuries	In percent (%)
18-25	0	
25-35	3	
35-45	6	
45-65	17	
TOTAL	26	100

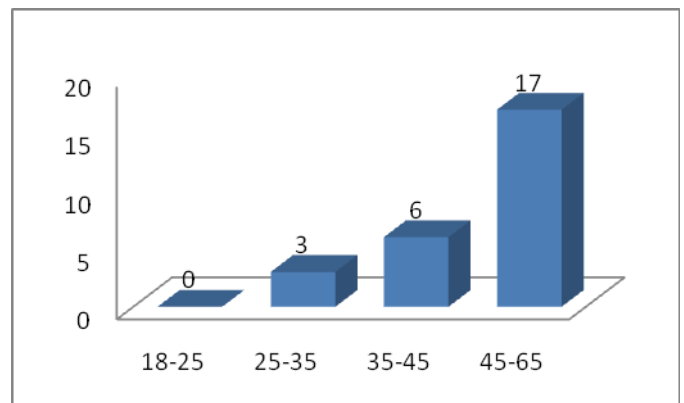


Fig. 4. Age of the injured person

Seeing the results from these criteria, there are with a core lance with the theoretical views of numerous foreign authors. Most of the injuries, to be more precise 17 out of total 26 (65.4%) are in the age where employees are more and more experience and several of them are before retirement (age 45-65). There are several factors for this situation, but among them I must say that the situation where employees consider that they know everything and they couldn't be injured

because they know the process is the main criteria for this kind of situation. Several steps could be taken with a final aim to reduce the number of injuries, but the main one is to have an open conversation with this category of employees (45-65), where several case-studies could be represented in a aim to reduce the injuries and to make them thing more and more that they can be also injured during every day work activities. This is also the work of the safety and health officers.

#### F. Cause/nature of the injury

Considering all of the above mentioned key points of view, the last but not the least is the cause of the injury. Considering the causes for injury they can be divided in several categories such as:

- Mechanical nature
- Chemical nature
- Electrical nature
- Equipment for personal safety
- Other

Seeing the categories, and regarding the processes of work, most of the spotted injuries are with mechanical nature (24 out of 26), and 2 from the category equipment for personal safety. In addition in table 5 and figure 5 it is given an illustrative view of this key point of view.

Table V  
CAUSE FOR THE INJURY

Nature of the cause	Total number of injuries	In percent (%)
Mechanical	24	92.3
Chemical	0	0.0
Electrical	0	0.0
Equipment for personal safety	2	7.7
Other	0	0.0
TOTAL	26	100

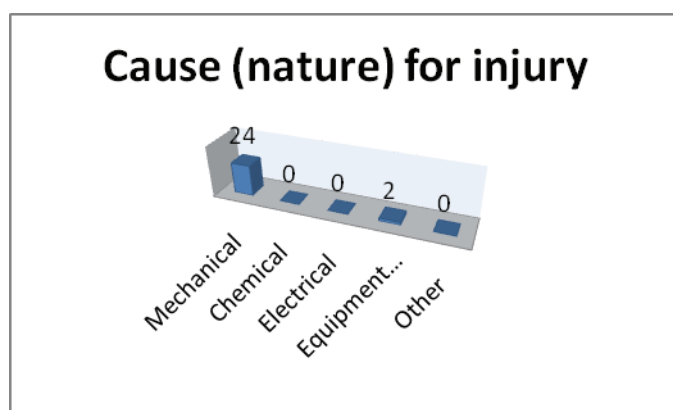


Fig. 5. Cause (nature) for injury

Seeing the results from the analysis of the key point – cause for the injury, the conclusion is that all of the injuries are as a

result of lack of attention or lack of equipment for safety on direct work places. This is a situation for further analysis, but that will be presented in a different paper.

## IV. CONCLUSIONS

Taking in consideration the information that is presented in this paper, as well as extensive analysis by category, the same one it is an excellent basis for taking preventive actions (primarily by the company, but also by the competent inspectorate), with the final aim of reducing the number of injured people. Considering the nature of the NGO Bitola (occupational and safety), the situation will be followed in 2013, after which actually at the end of this year (according to the number of recorded injuries) could be concluded whether any kind of actions, in aim to reduce the number of injuries, in this business entity were made.

## REFERENCES

- [1] I. Kuzmanov, "Case study of the number of injuries (considering several key indicators) in 2012 in real enterprises in Bitola's region", IJIAS 2013, journal in press
- [2] I. Kuzmanov, Z. Angelevski, "Conducted research on the nature and the number of injuries in Bitola's enterprises", NGO Bitola, 2012
- [3] S. Angelevska, "Benchmarking as a part of maintained management system in real industrial system", PhD. dissertation, TFB Bitola, 2007.
- [4] I. Kuzmanov, "Branding and implementation of ISO 9001:2008 and OSHAS 18001 as a model for continued improvements of the industrial systems", PhD. dissertation, TFB Bitola, 2012.