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Technical University of Sofia
Union of Scientists in Bulgaria
Telecommunications Association (ASTEL)
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WITH INTERNATIONAL PARTICIPATION

TELECOM 2017

**TELECOMMUNICATIONS YESTERDAY, TODAY,
FOREVER**



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**1.
ELECTRONIC COMMUNICATIONS MARKET - DEVELOPMENT AND
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9.

ON THE SPECTRA OF SCALE-FREE AND SMALL-WORLD NETWORKS

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This paper reviews the most commonly used models of complex systems and networks - Erdos-Renyi, Watts-Strogatz and Barabasi-Albert models. These models address different sets of properties and phenomena of real-life networks. Spectral analysis of the reviewed models has been made and also a dataset of Autonomous Systems (AS) links is been reviewed. Spectral analysis for the AS-links graph has been made and compared the spectra of the reviewed models. Based on this works, a new model can be developed, that better describes the unique characteristics of the biggest and most complex network - Internet.

10.

APPROACHES FOR THE FORMATION OF SIGNALS FOR ELIMINATION THE TRANSITION PROCESS BY THE TRANSMISSION

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At transmitting of digital signals arise transition process of the channel output, which to reduce the speed of transmission of the information. As a result of the transition process each transmitted symbol influences on the next symbol and changes its shape. The paper presents the optimization of the transmitted signal form in a linear channel for elimination the transition process of the channel output.

Keywords: digital signals, distortions between symbols, transition process, linear channel

11.

FIFTH GENERATION (5G) - MOBILE SYSTEMS AND COMMUNICATION TECHNOLOGIES OF THE FUTURE

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Mobile cellular networks are an indispensable part of today's existence, and will be tomorrow. As a basic technical characteristic of current systems, the speed of data transmission is considered. Users' needs are increasing and system requirements are increasing many times. Next generation networks need to be highly reliable, low latent, highly efficient and productive, energy-saving, provide massive connectivity and very high speeds. Over the last two, three years, "5G" is definitely one of the hottest keywords in telecommunications as well as in information technology (IT). With the introduction of the fifth generation and future technologies as mobile cloud, cognitive radio, virtualization,

software-defined networks, our idea of cellular mobile systems will change very significantly.

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12.

FEATURES IN THE DEVELOPMENT OF VOIP APPLICATIONS IN IOS PLATFORMS

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This paper describes the design choices when developing a VoIP application and the specifics for an iOS application. All examples are based on the our own developed VoIP system, including both the server and the client side.

Keywords: mobile VoIP applications, VoIP iOS, VoIP for iOS, VoIP

13.

WEATHER STATION FOR SMART HOME APPLICATIONS

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This report presents the development of a free hardware project for climatic and environmental home monitoring station with applications in smart homes (and greenhouses). Specific implementation uses open hardware platforms and free software, as well as original techniques for graphical visualization of forecasts, management, implementation of base algorithms for short-term local time forecasts, feasible to implement original intelligent heating decision making algorithms, lighting smart homes and small greenhouses for growing green vegetables (smart greenhouses and gardens). The system offers network connectivity and the ability to manage and monitor mobile devices.

14.

SYNCHRONIZATION OF EMBEDDED SYSTEMS BY OPTIMIZING THE COMMUNICATION PROCESS WITH A COMMON CLOUD-BASED ENVIRONMENT

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Summary: This article describes a way for communication and connection of IoT embedded systems to Cloud structures, as for this purpose are described used technology, as well way for synchronization and communication. They are used special IoT Cloud, as it receives data from IoT

15.

WIRELESS FIREWORK SYSTEM

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A fully computerized system for fireworks show is created. It consists of many firing modules which are governed by a computer through an interface module. Every firing module can produce 32 shots at given time each. The modules communicate with the interface module using wireless radio transceivers. The interface module is connected to a computer through USB and a computer program controls the process of the show preparation: test of each shot in each module, the loading of the time for each shot, the start of the firework firing and the synchronous music playing during the show.

16.

COMMUNICATIONS TO LTE USER GROUPS RELATED TO PUBLIC SAFETY

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The Long Term Evolution (LTE) technology, which has its roots in commercial mobile communications, is gradually becoming an influential solution for safety-related communications. The material analyzes how current LTE systems can support group public communication. According to security requirements, it can be argued that each LTE radio supports such a kind of public communication. In order to check whether LTE is applicable for such purposes, it is important to investigate whether one-to-one link-optimized LTE systems are capable of providing group communication - one of the most important concepts in public safety. By applying a new scheme for coding the indices to HARQ operations, it has been shown that the LTE system can provide group communication.

17.

NEW MATHEMATICAL MODEL FOR ANALYSIS OF SKIN EFFECT AND PROXIMITY EFFECT

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The skin effect and the proximity effect are phenomena that cause uneven distribution of the density of the conductive variable electric current. This leads to an increase of the active resistance of the conductor and a reduction of its inductance. In the unequal distribution of the current density, the active losses increase. In the unequal distribution of the current density, the active losses increase. The analysis of these phenomena is of paramount importance in the development of electrical and electronic products. This report uses a new mathematical model to analyze these phenomena. The model gives a clearer physical idea of the current phenomenon of redistribution of the electrical current density and the possibility

to obtain, with the help of a simple mathematical apparatus, results that are sufficiently precise for the practice. The report provides an analysis of single wire, single and multilayer coil effects.

18.

THE eHEALTH EDUCATION AT NBU - PROSPECTS, INNOVATIONS AND EXPECTATIONS

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The academic eHealth Education – a newly proposed program in NBU - is devoted to strategies for optimal realization of information products that are acquired or produced in the course of medical work. They are the result of clinical and para clinical information and communication processes, a reflection of "good practice" and evidence-based medicine.

In itself, it is a rational training that focuses on how to organize and deliver expert solutions to patients, in combination with development of a technological scheme on which base it would be structured, shared and applied.

The main purpose of this higher education is to prepare interactive specialists - a task which they will fulfill through a set of competencies combining the qualification of medical informatics, public health, telecommunication schemes and solutions, as well as being the main communicator in the team of medical expert / informatics' expert / software designer / hospital manager.

19.

USING GNS 3 FOR E-LEARNING ON IP-BASED TELECOMMUNICATION NETWORK

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This article proposes and explores a platform for modelling IP-based networks. The software allows modelling of IP-based networks with networking models of leading global manufacturers. This allows GNS 3 to be applied in the education of students or narrow network specialists. The program allows connection of the modelled network to real networks and the Internet. The software offers the opportunity to work with IP monitoring tools. This allows the processes in the modelled network to be monitored before it is realized. Different technical cases can be created with GNS 3 to test students' knowledge in real-life situations which occurs in the practice. As such they will be prepared for such situations.

20.

AUTOMATIC SYSTEM FOR CREATING REPORTS WITH INTEGRATED TABLES AND GRAPHICS

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The presented author-developed system is a set of program rows that send a generated pre-created result file with a measurement device into the IoT infrastructure monitoring and statistics system, form the information in a table, and send it to a predefined e-mail. Additionally, a program code has been added to facilitate installation of the system. The main parameters of the system are the ability to work on low-budget, economical and miniature OS Linux systems. Keywords: automatic email reporting, IoT

21.

MEASURING THE SIGNAL LEVEL IN THE 4G LTE NETWORK IN SOFIA,

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4G LTE networks are characterized by high-speed data rate, efficient use of the radio spectrum and low latency. For the successful implementation and deployment of 4G LTE networks in Bulgaria is extremely important to precisely determine the signal path loss (PL). The key parameter in determining the link budget of cells in the LTE network is the path loss and its accurate evaluation ensures high quality of offered service in the coverage area. The path loss of the signal strongly depends on the specific propagation environment. Because of this fact, it is necessary to measure the signal level in the investigated area and the obtained experimental results will allow to determine the path loss. In this paper are presented and analyzed the experimental results for the signal level in Bulsatcom 4G LTE network in Sofia - Studentski grad. The path loss exponent in the investigated region is determined, based on the measured data.

22.

OPEN INITIATIVE FOR PROVIDING FREE INTERNET ACCESS IN BULGARIA MOUNTAIN CHALETS

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The presented project presents an open initiative aiming at the aggregation of ideas, the collection of resources and the physical realization of the Internet connection to and in the chalets in Bulgaria. There is a pilot project providing Internet access to Kamen Del hut on Vitosha by WiFi (RLP). Described are building steps and subsequent additions related to providing CCTV, HTTP web access, and so on.

Keywords: Internet access in mountain areas, IoT

23.

AN IDEA FOR A FIFTH-GENERATION MOBILE COMMUNICATIONS ANTENNA

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A fifth-generation mobile communications antenna has been proposed in the article. Existing antennas of this type have been examined. Antenna requirements have been defined. A technical solution with Luneburg dielectric lens was proposed. The theory of antenna parameters is presented. Simulation of a 31-beam high-resolution ray antenna similar to filter banks in space is demonstrated. The advantages of the antenna and its applicability for fifth-generation communications are discussed.

24.

COOPERATIVE SPECTRUM SENSING – OVERVIEW

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Cognitive radio is a technology that meets the growing needs of wireless communications, providing more opportunities to access the radio spectrum. In order for the unlicensed users to realize their transmission, they need to find free space in the spectrum, but this is not always possible due to channel imperfections. Cooperative spectrum sensing contributes to more accurate and reliable detection of the licensed users signal. The article reviews most of the existing cooperative spectrum sensing techniques and data sharing algorithms.

25.

SCP-RPSC TECHNOLOGY IN THE MILLIMETER WAVE COHERENT TRANSPONDING SYSTEMS FOR IOT COMMUNICATIONS

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G generation mobile networks are the proposed next telecommunications standards. 5G research and development also aims at improved support of machine to machine communication, also known as the Internet of Things, at millimeter waves. The move to these extremely high frequency bands, as well as the new requirements to the 5G network parameters, need new approach for the future technical systems solutions. One of those is the use of microwave Coherent Transponding Systems, known until now as Radio Frequency Identification systems. Spatial Correlation Processing – Random Phase Spread Coding is a new technology in the field of microwave beam forming antenna theory, developed by the author one decade before. Its application in millimeter wave coherent transponding systems is proposed in this report. The system advantages are considered in detail too.

26.

GDPR ENTRAPMENTS. PROACTIVE AND REACTIVE (RE)DESIGN THINKING

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It's clear that GDPR is leading to an explosion of business opportunities. Companies attempting to develop their own IT innovations are quickly learning that providing safe, secure, privacy-sensitive data interactions is extraordinarily difficult. The article explores opportunities of GDPR implementation, approaches, as far-reaching regulation that turn focus on security of ICT systems to data-centric view point, likely to be the central governing framework for consumer-oriented companies and generating new business models across the globe. The analysis of consequences proves the need for new design thinking paradigm concerning future ICT systems and massive reengineering of existing, if organization works with the personal information of anyone in the EU, whether based there or not, GDPR applies to it. The article can be useful to researchers, project leaders, ICT systems designers, developers, executives or decision makers involved with data management, risk, information security and data protection

27.

INTELLIGENT METHODS AND CYBERSECURITY

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In conditions of the fifth generation of cybercrime, characterized by the automation of the development and dissemination of attack instrument, as well as integration within several sets of instruments, the most of experts believe that the traditional methods of protection are not enough effective and that a qualitative transition to new instruments for implementation of network and information security is required. One of the priority directions of this transition is the widespread application of intelligent methods for analyzing the information exchange, the network flows, the sources of threats and planning effective impact measures, including proactive ones. This report is dedicated to the application and experimentation of a specific artificial intelligence method for protection of network servers and hosts in the network at the Department of Information Technologies in Industry, Faculty of Computer Systems and Technologies at the Technical University of Sofia.

INNOVATION THROUGH DESIGN THINKING, USER EXPERIENCE AND AGILE: TOWARDS COOPERATION FRAMEWORK

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In the present paper are discussed the advantages and disadvantages of the methodologies of Design Thinking, User Experience design and Agile and it is argued that their collaboration into practice is important as it leads to higher creativity, innovation and profitability. The authors are aware that there are quite a few books and articles written on how to perform Design Thinking, incorporate User Experience into the Agile process, innovate and apply them together into practice of projects. After a short introduction into the models, it is revealed how best to collaboratively implement Design Thinking principles and Agile practices by giving example with the IBM Design Thinking framework.

The main advantages of the analyzed methodologies are that they have not been limited only to software development itself, they can be used by every type of business and can be implemented collaboratively at every possible level at the organization in order to generate more happy customers and manage to turn such happy customer into repeat customers.

Keywords: Design Thinking, User Experience Design, Agile, Innovation

BEST PRACTICES FOR DESIGNING USER EXPERIENCE FOR INTERNET OF THINGS AND VIRTUAL REALITY

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This paper is focused on the principles of designing user experience (UX) for Internet of Things (IoT) and virtual reality (VR) and creating effective user interfaces that incorporate wearable technology and rapid prototyping tools. New lean models will help to develop and cultivate new design processes and solve problems for products. It will emphasize product coherence among multiple devices including future UI design trends such as augmented reality, virtual reality and emotional design. Conventional interfaces are no longer adequate means for interaction and the traditional computing paradigm will be replaced or complemented by new forms of interaction. From a certain perspective, VR and IoT are two of the most important technologies to arise in the past decade or more. Taken individually, each technology represents a significant change. It is the confluence of these two developments, though, that offers the most promise and opportunity of all. VR and IoT share a similar basic philosophy and purpose. Both are about the merging of the physical and digital realms, though they approach the task from opposite directions. Where VR is about making the digital world seem real, largely through head-mounted displays, the IoT is about making real-world objects manageable in the digital. Designing for VR should not mean transferring 2D practices to 3D, but finding a new paradigm. Designers should expand their

expertise to different fields, such as psychology, architecture, sound design, lighting design and physics, in order to be able to create fully controlled experiences, guiding users in VR by shaping the virtual environment in such way. This paper aims to conceptualize the foundations of design and implementation of 21st century interactive technologies and make an overview of the best practices. While contemporary UI design techniques have been developed for the era of the PC, modern user interfaces are much more diverse and have to be designed for challenging contexts such as embedded and wearable computers and intelligent robotics. Designing in such context requires expertise in a large and diverse set of domains ranging from hardware-level sensor design all the way to user experience aspects. This paper addresses the vision that these requirements go largely beyond traditional UI design techniques, calling for next generation tools that can integrate all of them in a unified manner. Our research is based on the literature exploring various solutions in different fields like education, research, industry and gaming

30.

**ONE POSSIBILITY APPROACH FOR THE DEVELOPMENTS OF
ELECTRONICS IN BULGARIA**

Bozhidar Simeonov, Assoc. Prof., PhD, Eng.

The article presents the idea for one possibility for the integrated approach for the effective communications and using good European experience.

Keywords: electronics, development, integrity

31.

50 YEARS FIRST GRADUATE ELECTRONICS 1967 MEI SOFIA

Bozhidar Simeonov, Assoc. Prof., PhD, Eng.

The article presents 50 years anniversary of the electronics gratitude 1967, MEI, now Technical University Sofia 1967 and electronics development in our country.

Keywords: anniversary. development, graduate.

Information

for the participants and guests of Telecom 2017

Until 27 October 2017 detailed information on issues of the Conference can be obtained at the National House of Science and Technology in Sofia, 108 Rakovski St., V Floor, Room 506 or by phone: 02 987-97-67 and 0887508262.

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By way of exception the Registration Fee may be paid upon arrival at the Conference site in cash (Euro 55).

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The Organizing Committee will award a young author (up to 35 years old) for the best individually presented paper with substantial scientific research contribution.

