

## EXPERIMENTAL USER INTERFACES TO 3D VISUALIZATION OF C2 SYSTEM

Petr FRANTIŠ

**Abstract:** The article describes development of 3D visualization system that works with a Czech C2 system. It briefly describes the history of the Czech C2 system development and the current state in this area in the world. Various projects that contributed on development of the tactical data 3D visualization from the C2 systems are mentioned as the main contributors to development of the new visualization system. The main focus of the article is on using motion tracking and augmented reality approaches to simplify the user interface of this visualization system. The experimental application of motion tracked command post is described in detail and the results of this experiment are concluded, also the results of testing the augmented reality devices in two test scenarios are concluded as well.

**Keywords:** Command and Control. C2. Visualization. Augmented reality. Motion tracking.

## CHOSEN ISSUE OF WEAPON SYSTEMS EXPLOITATION RESEARCH

Kazimierz KOWALSKI

**Abstract:** Complex technical weapon systems meet with standard natural ageing processes, degradation and random failures caused by human faults, overloading or destructive acting of surroundings. Knowledge of a first period of utilization phase of technical objects, called infant mortality or "burn-in", is significant from point of view of confidence in performing an intended function of these objects. Models of infant mortality of crucial functional systems of main battlefield tanks were presented.

**Keywords:** Weapon system. Maintenance. Operational availability.

## INFLUENCE OF CHARACTERISTICS OF WHEELED VEHICLE SUSPENSION ON ITS ROAD-HOLDING ALONG CURVED STRETCHES OF TRACK

Mykhailo H. HRUBEL, Mariya B. SOKIL, Roman A. NANIVSKYI

**Abstract:** It's investigated the influence of the parameters that characterize the renewing force of nonlinear elastic suspension of wheeled vehicles on transverse-angular oscillations of a body and road-holding of vehicle along curved stretches of track. Obtained: the transverse-angular oscillation frequency of a body and critical value of stable motion speed as the function of the oscillation amplitude and the parameters that describe the gravity centre position of a body and renewing force.

**Keywords:** Transverse-angular oscillations. Amplitude. Frequency. Vehicle suspension. Road-holding.

## ARTIFICIAL NEURAL NETWORKS IN CRYPTOGRAPHY

Martin JAVUREK, Michal TURČANÍK, Marcel HAKAKAL

**Abstract:** The use of artificial neural networks (ANN) in cryptography brings many benefits for encrypting messages. Therefore, this article shows an overview of topologies of neural networks for use in cryptography. From the most known as is a Tree Parity Machine, through a Permutation Parity Machine to the use one of the most used ANN with Backpropagation algorithm as a Chaotic random numbers generator. Next, the article describes the learning methods used for the training TPM, such as Hebb's learning rule and Anti-Hebb's learning rule, Backpropagation and Genetic algorithm. Finally, it describes the basic attacks on the ANN such as a Simple Attack, a Geometric Attack, a Majority Attack and a Genetic Attack.

**Keywords:** TPM. PPM. ANN. Chua's circuit. Hebb's learning rule. Anti-Hebb's learning rule. Backpropagation Genetic algorithm. Simple Attack. Geometric Attack. Majority Attack. Genetic Attack.

## MATERIAL ANALYSIS OF DAMAGED 125 MM TANK MAIN GUN TYPE TK 2A46

David KUSMIČ, Zbyněk STUDENÝ, Vojtěch HRUBÝ, Emil SVOBODA

**Abstract:** In this paper are described procedures and methods used for material evaluation of materials applied for new damaged or wrecked tank main gun. Following approaches and devices were used for the main tank gun material analysis: sampling and samples preparation of the main tank gun core material, chemical composition analysis (for spectral analysis was the LECO SA – 2000 device used), microstructure evaluation (using the Neophot 32 light microscope, with digital camera Color View III $\mu$  Olympus device under magnification of 50x and 500x), material purity evaluation (due to the chemical composition of the steel was the inspection on the presence of oxides, sulphides, nitrides and silicates focused), assessment of the surface fracture, testing the mechanical properties - including the tensile tests (using the Zwick Z 100 testing machine), Charpy impact tests (instrumented impact tester Zwick RKP 450 IWI), fractographic analysis of the fracture surfaces of testing rods and hardness testing (Vickers HV<sub>30</sub>). The obtained values of material characteristics and microstructure evaluation were compared to the standard material values.

**Keywords:** Tank main gun. Material analysis. Microstructure. Mechanical properties. Fracture.

## MODELLING OF TASK FORCE STRUCTURES

Vlastimil MALÝ, Petr HRŮZA

**Abstract:** This article describes a new approach to the planning process and new possible way of selection forces for international operations based on modular structures and units' capabilities required for particular operation. Modularity of military units' structure contributes to the thoughtful and purposeful utilization of operational capabilities, with regard to the nature of the environment where units are deployed. Interests and ambitions of the Czech Republic do not exclude participation of the Armed Forces across the full spectrum of military operations, yet their involvement in ensuring the joint commitments is expected especially in stabilization and peace support operations. The article describes the options of original software application developed during the "STRUCTURE" project solution aiming as a support for staff officers in the preparatory phase of operational planning.

**Keywords:** Module. Modularity. Modular Structures. Task Forces. Operational Planning Process. Decision-making Process. Software. Database. Access. Microsoft Visual Studio. C# language.

## COMMON OPERATIONAL PICTURE AND A PROBABILISTIC MODEL FOR RECOGNITION IDENTIFICATION FRIENDLY OR FOE – IFF

Radoslav MASNICA, Jozef ŠTULRAJTER, Ivan PLICHTA

**Abstract:** When obtaining information from sensors and sources, a commander is seeking for information that is of value. Quality of information thus affects the decision of the commander. This article aims to describe a probabilistic model of knowledge on the battlefield and Identification Friendly or Foe – IFF and current overview of the situation for the commander and offers an introduction to the understanding of the relationship between information and their impact on the results of the fight. Such a model is used in other procedures to describe the relative information domination.

**Keywords:** Information domination. Identification Friendly or Foe – IFF. Common Operational Picture – COP. Command and Control System - C2. Sensors.

## THROUGH ECOLOGICAL RISK ASSESSMENT

Sergiy OREL, Oleksiy IVASCHENKO

**Abstracts:** The question of management by ecological safety of troops through assessment of ecological risk is considered in the article. As the model of risk assessment was used scheme, proposed by the United States Agency of Environmental Protection (USEPA). The main constituents of scheme are considered, applicable to ecological safety of troops. The example of ecological risk assessment for a military range is resulted.

**Keywords:** Ecological safety. Ecological risk. The Armed Forces. Risk assessment. Military activity. Human health. Biota.

## LESSONS LEARNED FROM MILITARY CYBER DEFENCE EXERCISES

Branislav KULICH

**Abstract:** Cyber attacks directed against the Armed Forces of NATO member states are on the rise. Range and sophistication of attacks are constantly evolving, moreover, we have to cope with increasing complexity and dependence on information technology. Cyber exercises in the military environment play an important role in the process of receiving human knowledge through experience. Furthermore, this experience is enhanced by synergic effect and competitiveness. This paper describes practical experience of such exercises in various stages and gives inspiration for future exercises.

**Keywords:** Cyber defence exercises. Incident handling. Red team. Talent management. Locked shields.

## QUALITY VALUE ANALYSIS FROM CUSTOMERS' POINT OF VIEW

Iveta KMECOVÁ, Robert ZEMAN, Daniel KUČERKA, Monika KUČERKOVÁ

**Abstract:** In our contribution we highlight the importance of marketing and its great influence on running a business successfully. We present some results of the research focused on judging the process of providing quality value in business field.

**Keywords:** Marketing. (Quality) value. Customer. Business. Price of a product. Quality of a service.

## HEALTH SECURITY IN THE EUROPEAN UNION

František GUBÁŠ

**Abstract:** Nowadays, at a time when the traditional view of security was challenged by the absence of military confrontation between states and nations, growing awareness is devoted to other sectors of security. The new phenomena that recently emerge are public health problems as a threat to security. The most serious problem is considered possible impact of the spread of communicable diseases and bio-terrorism upon security, particularly upon the stability of state and its armed forces. At a same time, the impact of health issues upon security of individuals and groups began to be recognized. Outbreak of pandemic influenza in 2009 spread all over the world proved that it is necessity to pay maximal possible attention to issues of health security.

**Keywords:** Security. Health security. Public health. Health threats.

## MODELLING OF THE INVESTIGATION OF CYBERCRIME

Josef POŽÁR

**Abstract:** The continuing technological revolution in communications and information exchange has created an entirely new form of crime, cybercrime. Cybercrime has forced the computer and law enforcement professions to develop new areas of expertise and avenues of collecting and analyzing evidence. The article deals with selected aspects of computer crime with stress on some ways of forensic investigation of this phenomenon. Some typical ways of committing computer crime with regard to investigative situations are described here. The process of acquiring, examining, and applying digital evidence is crucial in the success of prosecuting a cybercriminal. In conclusion the author refers to possible education of the police officers about computer crime.

**Keywords:** Computer crime. Models of Digital Forensics Investigation. Event reconstruction. Crime Scene Investigation.