



# National Technical University "Kharkiv Polytechnic Institute"

## Department of Computer Science and Intellectual Property

### Proposals for International Cooperation





# Department of Computer Science and Intellectual Property

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**The department trains:**

- Bachelor specialty "Computer science and information technologies"
- Master specializations: "Information and Knowledge Engineering" and "Intellectual Property in Technological Entrepreneurship".



The department "Information and intellectual property" scientific and scientific-technical activity is carried out in the following areas:

- Economic and legal issues of technology transfer and use of intellectual property;
- Theory, technology and tools of engineering data and knowledge;
- Image recognition based on test complex hypotheses for quantitative and qualitative features of estimates;
- Development of analytical instrumentation and software for the study of economic and mathematical models of business processes;
- Optimization of information support of research and innovation activities.





Department "Information and intellectual property" is an academic partner of the world leader in IT technology company IBM.

The Department operates Academic competence center IBM and collaboration with the Institute of Advanced Research and Technology «INSART» laboratory «IT Incubator».

Teachers of the department received four grants IBM Faculty Award for the implementation of IBM open standards and enterprise technology in the educational process.



# Cooperation subject: Data-Information-Knowledge Engineering

Object of cooperation are service-oriented information technologies and means of consolidation of the non-uniform data/content, analytical, algorithmic, program and hardware resources, interfaces, jobs and administrative processes by information infrastructure of intellectual information and communications systems for implementation of services of consolidation of information of corporate level on the basis of cloud computing, GRID and mobile technologies, analytics of "Big Data" and "Data Science", technologies of socialization and information security which provide (a cooperation subject) access to opened as structured, and to unstructured knowledge which shall be in a special way competent is selected, analyzed, evaluated, structured or/and re-structured for decision-making support, solutions of problems and satisfaction of information needs of certain clients or social group which differently can't effectively and rationally address this knowledge because it is hard available in primary form and is distributed on many information resources.



# Cooperation subject: Data-Information-Knowledge Engineering

**Novelty:** technologies developed by employees of the department (an artificial intelligence, social, GIS, estimations of probable characteristics, simulation of pseudorandom objects) processing of large volumes of data on the basis of SOA and BI.

**Practical significance:** startups on the basis of the Information and technological incubator (IT2) and the Academic center of competences of IBM on commercialization and a transfer of the developed technologies in IT industry/business.





# Cooperation subject: The development of the theory of building a detector of artificial neural networks

Architecture and operating principles of detection of artificial neural networks (DANS) have a biological background and justification. The basis of the construction, and operation of training data networks is the paradigm of the detector, which is an alternative to the classical connectionist paradigm of building artificial neural networks (ANN). Unlike connectionist ANN using formal models such as McCulloch-Pitts neurons DANS are based on information models of neurons and neuronal detectors, analyzers, generators of information processing modules. DANS Education is based on the procedure of counter-learning modules presentational and representational subsystems. In the process of learning of the neuron-detector is carried out to minimize the its concept, defining the necessary and sufficient conditions for the excitation of the neuron. The training is carried DANS self-structuring cards detectors recognition features.



# Cooperation subject: The development of the theory of building a detector of artificial neural networks

## Scientific novelty:

- Detector paradigm constructing ANN;
- Model of a neuron-detector;
- Model of a neuron-analyzer;
- Procedure oncoming training DANS;
- Procedure self-structuring detectors neurons DANS;
- Architecture DANS.

**Practical significance:** creating a new generation of ANN, which are able to deal effectively with a wide range of problems of recognition

## Literature

Parzhin Y. Hypotheses of neural code and the information model of the neuron-detector. Journal: ScienceOpen Research – Section: SOR-COMPSCI DOI: [10.14293/S2199-1006.1.SOR-COMPSCI.AP5TO7.v1](https://doi.org/10.14293/S2199-1006.1.SOR-COMPSCI.AP5TO7.v1), 2014. 38c.

Parzhin Y. Principles of modal and vector theory of formal intelligence systems. Journal: The Computing Research Repository (CoRR) ARXIV: <http://arxiv.org/abs/1302.1334> (2013) 34 p.