

REVIEW

for procedure for academic position "professor"

Professional area: **Informatics**

for the Institute of Information and Communication Technologies – Bulgarian Academy of Sciences (IICT-BAS), department "Mathematical methods for processing sensor data"

Candidate: associate prof, Ph.D. **Petia Doicheva Koprinkova-Hristova**

Referee: prof. D.Sc. Ph.D. Todor Atanasov Stoilov, Institute of Information and Communication Technologies – Bulgarian Academy of Sciences, Sofia, Acad.G.Bontchev str. BL.2

The competition is published by IICT-BAS

I. Common biographical data of the candidate

Main data about the education and for her scientific degree and academic position of the candidate are summarized in tabl.1

Table 1.

Name	born	Висше образование	Scientific degree Ph.D.	Associated prof.
Petia Doicheva Koprinkova-Hristova	1966, Sliven, Bulgaria	1989 г. – Master degree from the Technnical University of Sofia, speciality "biotechnics"	2001 – High Attestation Commission	2003 – High Attestation Commission

Petia Koprinkova-Hristova graduated in 1989 г. in Technical University of Sofia as master degree in specialty "biotechnics". In 2001 she defended the educational scientific degree Ph.D., which is approved by the High Attestation Commission of Bulgaria. Since 1989 till now she is working in different research institutions affiliated to Bulgarian Academy of Sciences: Central Laboratory of Bioinstrumentation and Automation, Institute of Control and Systems Researches, Institute of System Researches and Robotics, Institute of Information and Communication Technologies. She took sequentially academic position as specialist, assistant professor, associated professor. Currently she is associate professor in IICT-BAS, department "Mathematical methods for sensor data processing".

II. Common presentation of the candidate's materials for the competition

The presented research papers for the competition for the academic position "professor" are prepared according to the legislative requirement in Bulgaria: The Law for academic promotion, The Rules for the application of this law and the internal rules of BAS and IICT-BAS. Particularly the internal rules for this position in IICT-BAS are the most restrictive. That's why the referee makes assessments about the candidate achievements towards the internal requirements of IICT-BAS.

Indicators group A: it is presented a diploma for defense of the educational and scientific degree Ph.D. The candidate satisfies the requirements for this indicator.

Additional document from IICT-BAS which proves that the candidate was on position associate professor for more of 2 years. The candidate satisfies the requirements for this indicator.

Indicators group B: These indicators insist that the candidate has habilitation thesis or to have several publications, which are indexed in Scopus and/or Web of Science. The presented publications are classified as: 1 paper in -Q1; 1 in -Q2; 7 papers with SJR rank; 6 papers, which are referred in Scopus and WoS. The IICT-BAS requirements insist 100 points. The candidate covers 302 points with the presented papers, which satisfies the legislative requirements for this indicator.

Indicators group Г: scientific publications, which are refereed and indexed in world recognized data bases with scientific information (Web of Science and Scopus); 2 papers - Q1, 1 paper - Q3, 1 paper - Q4, 16 papers with - SJR, 11 papers – in refereed editions. The requirements of IICT-BAS insist to be achieved 260 points. The candidate covers 606 points with the presented papers, which satisfies the legislative requirements for this indicator.

Indicators group Д: citations in scientific publications, monographs, collective preprints, patents, which all are refereed and indexed in world recognized data bases with scientific information (Web of Science and Scopus) - 132 citations. The requirements of IICT-BAS insist 140 points. The candidate with the list of presented citations covers 792 points, which satisfies the legislative requirements for this indicator.

Indicators group E: participation in projects, attracted resources from projects, publication of University textbook. The IICT-BAS requirements insist achieving 150 points. The candidate presents a list of appropriate documents and he covers 420 points, which satisfies the legislative requirements for this indicator.

As a conclusion, the referee summarize that the candidate satisfies and considerable covers several time over the legislative requirements for the different group of criteria analyzing its scientific production and research activities. The candidate has correctly calculated and proved with appropriate publications and documents his points for the different categories of indicators. For all set of indicators assoc. prof. Petia Kopronkova-Hristova has considerable overrating according to the legislative levels, defined by the internal rules of calculations of IICT-BAS.

The referee makes a conclusion that the candidate could be eligible in this competition with less number of publications, which also can cover the legislative requirements for the position "professor".

III. General characteristic of the research and experimental works of the candidate

The referee assesses that the researches of Petia Koprinkova-Hristova address three general scientific domains:

- Developments of new models of neural networks and modification of algorithms, used for evaluation of the neural networks parameters. The publications in this domain, which have scientific results addressing special type of neural networks, which has "echo" reply for their states. For this type of neural networks it has been applied a special method for training, titled "adaptive critics". Than this type of neural networks is studied and assess for their limitations and domain of application. It has been derived heuristic algorithms for training of the neural networks. It has been assessed the boundaries of their numerical stability.

- Processing sensors information for the motion of human eyes. Such an analysis allows to be estimated parameters of human state and human behavior.

- Application of neural networks and fuzzy sets for the definition of optimal components in alloyed materials, monitoring parameters in fermentation process, noise recognition and analysis of fan operation.

The referee assumes that the presented main research domains for which the candidate presents research and application results have internal complexity and they are not trivial in nature. To be made researches in these domains it is require from the scientist to acquire considerable knowledge for the theory of fuzzy sets, neural networks and to be close with the internal relations in complex objects like biotechnological ones, mechanical technics and robotics systems, and physiological peculiarities of the human vision. These requirements prove that Petia-Koprinkova-Hristova has considerable acquired research experience and expertise to work in complex technological and scientific domains.

In the presented publications for the current competition Petia Koprinkova-Hristova presents also additional research results, which make contributions to others domains and objects: differentiation the meaning of words, processing satellite madden pictures and images, integration of data from different measurements (gyroscope and accelerometer).

The referee gives high level of assessment for the research and experimental works of the candidate. It has been developed models and algorithms for identification, control, quantitative estimation of parameters in complex systems. These models and algorithms have been applied for automatic control of biotechnology systems. It has been derived solutions to monitor and estimation the internal parameters of such objects, where direct measurements are not possible to be made.

The presented publications for the competition from the candidate have strongly defined research character. It is obvious the candidate aims were to be applied the research results in practical solutions and cases.

The referee assumes that the presented research domains and achieved results and their applications in practical cases of complex systems allow to be given positive assessment of the research activities of the candidate.

The candidate presents also a text book "Kinetics and control of bioprocesses" for Universities and High Schools. This is a positive attestation for the professional qualification of the candidate for the domain of bioprocess systems.

IV. Assessment of the pedagogical activities of the candidate

The candidate had activities as University people. In Technical University of Sofia, branch Plovdiv he had lectures and exercises for the discipline "Control of processes and production automation" for the period 2012-2016.

The referee assumes that the pedagogical activity of the candidate confirms with the requirements for and academic lecturer to have additional lecture activity in companion with his research works.

V. Main research and experimental achievements

The referee assumes that the presented publications contain research and practical contributions, which can be defined as follows:

Research contributions which the candidate presents in his publications are: development of new formal models in the research domain of neural networks and fuzzy sets. These models apply new type of neural networks, which have "echo" state. For this type of neural networks has been applied method for "adaptive critics" needed for the education and later for the testing of the neural network. It has been developed new heuristics algorithms for the education of the neural networks.

Research and practical contributions which the candidate presents in his publications result from the pure research achievements for the modeling and definition of neural networks and fuzzy sets. These results address applications in biotechnology systems, technical systems, and physiological activities of the human body.

The research and practical contributions are positively evaluated by its publishing in high rated journals and their indexing in scientific data bases. As a form of positive assessment from the international research community is the presented lists of 163 citations of the candidate's papers

VI. Significance of the contributions for the science and practice

The referee assumes that the candidate has representative international and National participation in scientific events, organized in our country and abroad. It has been presented in the documents of the candidate a long list illustrated that Petia Kopronkova-Hristova participated in many International Program Committees. She is a member of the editorial staff of the scientific journal Automatics and Informatics. With other documents the candidates proves his participation as editor of scientific Preprints of events, organized abroad. She has been invited also as plenary speaker on international event abroad.

The list with research projects, where the candidate participated is quite long. Such projects have been funded by Scientific fund of Bulgaria, which is a National recognition of the usefulness of the candidates researches. The referee assesses

positively these activities and results of the candidate for the presentation and dissemination its competence in our country and abroad.

VII. Critical remarks and recommendations

The referee doesn't make critical remarks to the research results, works and publishing activities of the candidate. I find that Petia Koprinkova-Hristova acquires very deep research experience and it will be useful such experience to be shared in the future with young researchers under the form of supervision of Ph.D. students and/or development academic projects, which belong to the planning activities of IICT-BAS.

This wide experience of the candidate can be used also for the management of projects, funded under the different frameworks in our country.

VIII. Personal impressions and position of the referee

I had the opportunity to know and to follow the research activities of the candidate for a long time in the Bulgarian Academy of Sciences. My personal opinion has long time duration and it is positively defined, because Petia Koprinkova-Hristova applies enormous hard works in her researches. Her results are evident not only on scientific domains but in practical cases and applications.

I make a personal assessment that the candidate has achieved the levels of "professor" position event time before.

The referee assumes that the general research and practical contributions in the works, presented for this competition are personally made by the candidate and/or with her active participation.

In the works of assoc. prof. Ph.D. Petia Koprinkova-Hristova the referee assumes that there are valuable *research and practical contributions*.

Conclusion:

The candidate in this competition assoc. prof. Ph.D. Petia Koprinkova-Hristova is presented with enough set of research works. In the candidate's works there are original research and practical contributions.

I find the legislative requirements of Bulgarian Academy of Sciences and IICT – BAS are satisfied. All upper said and after my acquaintance with the presented papers and their contributions with research and practical results gives me ground to suggest **assoc. prof. Ph.D. Petia Doicheva Koprinkova-Hristova** to take the academic position "professor" in the scientific domain "**Informatics**", professional area 4.6 Informatics and computer sciences".

08.10.2019

Referee:

**NOT FOR
PUBLIC RELEASE**

Prof. D.Sc. eng. Todor Stoilov