

## REVIEW

- by: PENCHO GENOV MARINOV, Prof. Dr., ИИСТ - BAS  
(Institute of Information and Communication Technologies)  
Section "Parallel Algorithms"
- on: the competition for academic position "Associate Professor",  
Area of Higher Education 4. "Natural Sciences, Mathematics and Informatics"  
Professional Field 4.6 "Informatics and Computer Sciences",  
Scientific Specialty "Image processing"  
the competition is announced in the Newspaper of State, No. 68/31.7.2020, p. 65
- for: needs of Information technologies for Sensor Data Processing Department  
at the Institute of Information and Communication Technologies  
Bulgarian Academy of Sciences
- with: the sole candidate Dr. DMITER PETKOV PRODANOV

### 1. Reason and general description of the submitted materials.

By order No. 194/07.10.2020 of the Director of the Institute of Information and Communication Technologies at BAS, pursuant to Art. 4, para. 2 of the ASDARB (Academic Staff Development Act of the Republic of Bulgaria), Art. 30 of the Rules for the Implementation of the ASDARB, and Art. 6 of the Regulations on the terms and the conditions for acquiring academic degrees and for occupying academic positions at BAS, and according to a decision of the Scientific Council of ИИСТ-БАС (Protocol No. 9/30.09.2020) I have been appointed a member of the scientific jury in accordance with the procedure described above. As a member of the scientific jury of his first meeting (Protocol No. 1 from 12.10.2020) I was appointed a reviewer and received the materials of the procedure.

Description of the received materials: (at the beginning is the name of the folder containing the group of documents)

1. 1\_application: with Application of the candidate for admission to the competition (from 14.08.2020). Ends with an inventory of the submitted 12 groups of documents. There are some discrepancies in the numbers in the list of documents in the Application and in the attached document folders on CD, but when the documents themselves and the document folders are opened, everything finds its place.
2. 2\_cv: European CV in Bulgarian and English. Briefly about Dimitar Prodanov: he was born on March 16, 1975; holds Bulgarian and Belgian citizenship; 1993-1999 Medical Doctor from the Medical University - Sofia; 2002-2006 Philosophy Doctor (PhD) from the University Twente, Enschede, The Netherlands; junior research associate during his doctoral studies in Enschede and Leiden (Netherlands); Post-doctoral fellow and researcher 2006 - 2007 at the Catholic University of Leuven, Brussels; 2007 - 2008 University of Liège, Belgium; (2008 - December 2012) Senior Researcher at IMEC, Leuven, Belgium; (January 2013 - so far) associate researcher Leuven, Belgium and NanoStreeM H2020 project coordinator. He speaks English, Russian, French, Dutch.



3. **3\_PhD**: Copy of Doctor's and PhD diploma. There are three documents in this folder: one in English from 26.01.2006, one in Dutch from 2007 and NACID Official Note certifying the available information for Defensive Dissertation Abroad (Enschede, The Netherlands), Dissertation Topic: Quantitative Microscopic Analysis of Peripheral nerves. Anatomical data for the development of neuronal prostheses, (Morphometric analysis of the rat lower limb nerves. Anatomical data for neural prosthesis design); Diploma 662-VAK/23.06.2006, approved by Protocol 18/11.06.2008. Morphometric analysis of the rat lower limb nerves. Anatomical data for neural prosthesis design; Twente University; The Netherlands; defended 2006;
4. **6\_qualif**: Certificate of internship in the specialty. There are four documents in the folder: Official note from IICT-BAS, Ref. No.701/14.08.2020 with the assurance that the candidate works as a programmer on a 2-hour working day from 01.10.2019 with work experience in the specialty 3 months; Official note from UCLouvain, for work experience as an invited research associate for a period of one year (01.04.2006 - 31.03.2007); Note from IMEC, Leuven Belgium for 2 years of experience (April 2008 - April 2010) as a researcher; Letter of recommendation from Prof. Sebastian Hessler (IMEC, Leuven 15/8/2020) confirming that " Dr. Prodanov has been an integral member of our research team since the opening of the institute in 2010. His research is broadly focused on neuroinformatics, where he has made several important contributions " and have listed five of these contributions (in articles and reports).
5. **7\_publist**: List of scientific publications for participation in the competition. The table is in the form of NACID (National Centre for Information and Documentation) for RAS (Register of the Academic Staff) and it is for three types of publications: articles in magazines and series - 11, conference reports - 14, chapters from collective monographs - 3.
6. **8\_demo\_patents**, **8\_projects**: List of inventions and other scientific and applied results.
7. **9\_citations**: List of citations. A column with the number of citations of the respective publication has been added to the table of scientific publications. Attached are 12 SCOPUS reference files for each of the cited (12) publications.
8. **10\_abstracts**: Abstracts of scientific publications for participation in the competition - in Bulgarian and English. Attached are for 11 (out of 11) articles in magazines and series, for 3 (out of 14) conference papers and for 1 (out of 3) chapter of a collective monograph. There is a separate link to 8 more abstracts in magazines in electronic form.
9. **11\_articles**, **11\_chapters**, **11\_conf** Copies of scientific publications for participation in the competition. By groups (sub-folders), respectively (11, 3, 13) pieces. According to the reviewer, there is no publication file with code P2009G, from the group "conference reports". Exactly this code is duplicated with the publication code from **11\_chapters** . Attached are three references from the Journal Citation Reports to help reviewers.



10. 12\_minreq: Reference for fulfillment of the minimum requirements of IICT.
11. 13\_contrib: Reference to original scientific and applied scientific contributions. There are 2 redundant files in the folder.
12. 14\_decl: Declaration that there is no legally proven plagiarism in scientific papers. (from date 14.08.2020)

The names of the folders on the CD start with numbers that correspond to the numbers of the points from Art. 9(1) of *Regulations on the specific conditions for obtaining scientific degrees and holding academic positions at IICT-BAS*, and they cover the requirements of art. 24(1)1r-5, Art. 26 from ASDARB also *Regulations on the terms and the conditions for acquiring academic degrees and for occupying academic positions at BAS*.

## 2. Evaluation of publications and citations.

Publications: The candidate participates in the procedure with a total of 28 publications, according to the given list in the folder 7\_publist grouped by types B = "articles in magazines and series"; C = "conference reports"; E = "chapter of a book or collective monograph" and their number is respectively (11, 14, 3) = (B, C, E).

The number of publications is 17 according to the materials in the folder 12\_minreq. Here the types are B = {Indicator 4}, D = {Indicators 7 and 8} from the NACID forms, and the numbers according to the indicators respectively (3,11,3). By types respectively (B, D) = (3, 14). It is followed that 3 of the publications type "C" have passed in type "D" (indicator 7), and the other 11 have dropped out - even without them the requirements are overfulfilled. Publications of type "E" have passed to type "D" (indicator 8).

Regarding the quality of the publications (for the 17): All are visible in SCOPUS, WoS, as the distribution: by quartiles for publications with IF e 4-Q1, 2-Q2, 2-Q3, 1-Q4; for others 3-SJR, 2-{w/o SJR}, 3-in chapters.

Regarding the number of co-authors: independent are 2, 6 - {with 1 co-author}, 1 - {with 2}, 8 - {with 4 and more}.

In the next section 5 of the review below, you will see the dimension in points for both publications and citations.

Citations: 12 works of the candidate are cited. A list of citations from SCOPUS is attached to each cited work. Auto-citations are in 5 of these lists - a total of 7. For two of the cited works the points are calculated incorrect - the difference is 69 points to the detriment of the candidate. Apparently the inaccuracies have been neutralized, because after the reviewer calculated the points, a difference of 6 was obtained. All citations are visible in SCOPUS.

## 3. Teaching and participation in projects.

A list of inventions and other scientific and applied results is in two sub-folders. 8\_demo\_patents, 8\_projects. In the first sub-folder is the evidence for three probationary results. They are in the second sub-folder described 3 applied research projects and 6 software packages supported by a Bibliography of 15 papers (articles and reports) on them. Dr. Dimitar Prodanov is a participant in an international project FWO-BAS Project "Application of the multi-scale space in segmentation of ultrasound and time-lapse



microscopic images”, as a leader from the Belgian side (on the Bulgarian side the host is Kiril Alexiev); participant in the national (of Belgium) project "IBRO Fellowship"; Head of the Belgian National Project "BrainSTaR: Wireless Microsystem for Brain Stimulation and Recording in Small Animal Models". Three files are attached: (1) An article from the IBRO newsletter describing the project; (2) Printout from the IMEC website for the BrainSTaR project; (3) Letter from FWO announcing the winning of the joint project with BAS.

#### 4. Evaluation of contributions.

The document in the folder `13_contrib` is 15 pages with a detailed description of the main contributions to the publications, involved in the procedure. We will refer to the publications with their codes given in the list of publications. The publications themselves are located in three main areas of research of the candidate Dr. D. Prodanov.

##### (1) Neuroinformatics frameworks for signal processing and data analysis

During the period 2005 - 2011 the applicant has developed an information system for morphometric data management. The functionality of the system is described in detail in (P2011B) - publication with IF (Q1). The system interacts with "ImageJ", as the main tool for segmentation and measurement in MATLAB, as a common computing environment. In parallel with its development, the System has been used in several other publications (P2008B, M2013B), chapter of the book (P2012G), further (P2015B), (D2019B), (A2019B).

Since 2014, under his leadership, an image segmentation platform, Active Segmentation, has been developed. based on machine learning. Development versions are presented in a series of short messages (V2016G, V2015G, P2013G, P2011C, GF2015G, K2013G, P2013G, P2008) and demonstrated at specialized international meetings.

##### (2) Algebraic tools enabling computational biology

The main contribution in this direction is the development of a package for Clifford algebras, described in (P2017G) and (P2017G2). During the development of the package, a significant degree of generalization was achieved, going beyond the problem of anomalous diffusion formulated in (P2016B). According to the candidate in this regard, a direction for future work will be the development of a package of differential forms based on Clifford. This will greatly facilitate the interpretation of mathematical works formulated in this language. For example, in this way a physically correct generalization of the Laplace fraction operator can be achieved, for which there are several generalized mathematical formulations. The publication (P2016B) is also in this direction.

##### (3) Neuroprostheses and plasticity of the Central Nervous System.

This field covers works that are either a direct continuation of the candidate's doctoral dissertation (IBRO Fellowship), or are related to work on the BrainSTaR project, led by him during the period 2013 - 2014. Also included is his earliest scientific work (P1998G), which sparked his interest. to the problems of neuronal



trauma and prosthetics of CNS function. The publications in this direction are: the chapter from a book (B2010G), the publication with IF (Q2) - (W2013G), publication with IF (Q1) - (ML2012G), publications (M2009G), (M2010G).

### 5. Fulfillment of scientific and metric requirements.

Group indicators	Content of the group	Requirements for "assoc. professor "	Score of Dr. D. Prodanov
A	Indicator 1 (dissertation)	50	50
B	Indicators 3 or 4	100	150
G	Indicators 5 to 10	260	343
D	Indicator 11	70	870
E	Indicators from 12 to the end	20	50
<b>Total</b>	<b>for all metric groups</b>	<b>500</b>	<b>1463</b>

The candidate has filled in "Information on the implementation of the minimum requirements of IICT" for the academic position "Associate Professor", for the field "4.6 Informatics and Computer Science". The reference table is in the form required by NACID for "Register for the scientific activity" and "Register of the academic staff", and the points are consistent with *Regulations on the terms and the conditions for acquiring academic degrees and for occupying academic positions at BAS*, as well as *Regulations on the Specific Conditions for Acquisition of Academic Degrees and Occupation of Academic Position at the IICT - BAS*

Here I will mention some inaccuracies I have noticed, which must be removed when submitting the data for the NACID register. I will only note that the points with the minimum requirements of NACID are different and the overfulfillment in the attached here Table will be even larger.

In the candidate's materials, the price of two of the three articles is marked at 75, not 50. But the amount corresponds to a price of 50 and the indicator group "B" is again overfulfilled. The discrepancy in the years for the third job, which is from 2011, is also inaccurate, and IF 3.261 (Q1) is from 2014.

For the group of indicators "G" is also overfulfilled, and the condition that the participants in this procedure did not participate in previous ones it is not guaranteed for only one work from 1998, which is before the defense of the dissertation. The reference made in the NACID register shows that the rules have been observed.

For the group of indicators "D" we have more than 10 times overfulfillment. Here are the most inaccuracies. On the other hand, the difference in the points given by the candidate and the ones calculated by the reviewer is less than 1 %. (876 and 870 points respectively)

The requirement for the group of indicators "E" has been exceeded more than twice. There are no inaccuracies here.

### 6. Critical remarks, compliments and recommendations.

medskip One recommendation: It is good to include the year in the publication code, but this code is not used for citation file names in the 9\_citations folder and files in the 11\_{articles, chapters, conf } folders This would facilitate the review work.

In the course of the review, some inaccuracies were mentioned in the materials submitted for the competition. They are rather proof that the reviewer has read the documents in detail.

*I have no critical remarks, which would call into question the candidate's contributions and which would influence my positive assessment at the end of my review.*

7. Personal impressions about the candidate and other data not mentioned in the previous points.

I do not know the candidate personally. We have no conflict of interest in the sense of the rules and on the occasion of my participation in this Scientific Jury.

When searching through SCOPUS the author's name is visible: 45 publications, 502 citations, h-index 12.

For reference in Web of Science ResearcherID: 41 publications, 515 citations, author's h-index 12.

## 8. Conclusion.

Considering that: the candidate has sufficient scientific and scientific-applied contributions, the achievements have been announced among the scientific community in sufficient and high-quality publications, scientific symposia, participation in research projects – and made sure that all requirements, conditions and criteria were met: *Academic Staff Development Act of the Republic of Bulgaria (ASDARB), Rules for the Implementation of the ASDARB, Regulations on the terms and the conditions for acquiring academic degrees and for occupying academic positions at BAS, as well as Regulations on the Specific Conditions for Acquisition of Academic Degrees and Occupation of Academic Position at the IICT - BAS*

*I have reason for the following conclusion:*

I give a positive assessment of the materials with which the applicant participates in the competition for Associate Professor. I recommend the members of the Scientific Jury, and then to the Scientific Council of IICT-BAS to choose Dr. DIMITER PETKOV PRODANOV, to take the academic position Associate Professor, in Higher Education Area 4. "Natural sciences, mathematics and informatics", Professional Field 4.6 "Informatics and Computer Sciences", specialty "Image Processing", Information Technologies for Sensor Data Processing Department at the Institute of Information and Communication Technologies – BAS

Dec. 04, 2020  
Sofia

Reviewer:

**NOT FOR  
PUBLIC RELEASE**

/ Prof. Pencho Genov Marinov /