

STATEMENT

for a contest for the academic position of "Associate Professor",
in the field of higher education 5. "Technical sciences",
in the professional direction: 5.2. "Electrical engineering, electronics and automation",
announced in State Gazette (SG) No. 69/16.8.2024,
with candidate: Tatiana Dimitrova Dobreva, PhD, Eng., Assistant Professor.

Member of the Scientific Jury: Lubomir Valeriev Bogdanov, PhD, Eng., Associate Professor

1. Overall characteristic of the applicant's research and scientific applied activity

Tatyana Dimitrova Dobreva, assistant professor, Ph.D., has submitted for participation in the contest scientific works, other than the dissertation work for the degree "Doctor", as follows:

Group of indicators	Minimum number of points	Applicant's number of points	Number of points by main indicators per group	
A	50	50	Diploma No. and date of issue: No. 28538 / 26.06.2003 Scientific Specialty: "Automated Information Processing and Control Systems in Medicine"	
B	□			
V	100	189	V3	
			V4	189
G	200	311	G5	
			G6	
			G7	163
			G8	148
			G9	
			G10	
D	50	100	D12	100
			D13	
			D14	
			D15	
E	□	80	E25	
			E26	80
J	-			
Z	□			

A total of 38 scientific publications were presented in the contest. Of them:

* 20 are referenced and indexed in Scopus – 10 in a list according to indicator V4 and 10 in a list according to indicator D7;

* 18 in non-refereed journals with scientific review in a list by indicator D8. In 8 of the presented publications, the candidate is the first author.

The number of citations exceeds 2 times the minimum requirements, which makes a very good impression. Out of a total of 258 citing sources, 234 are from articles with foreign authors.

The candidate participated in 2 research projects, for which she received a certificate from the company Schiller AD for the development of a new method for filtering electromyographic noise in electrocardiograms.

Two patents have been filed - one for the "correlated multiple sampling" (CMS) method and one for the "synchronous filtering of biosignals" method.

The presented scientific papers (**730 points**) significantly exceed ($\approx 83\%$) the minimum requirements (400 points) for AD "associate professor" according to ASDOAP - BAS.

2. Main scientific and applied contributions

Contributions in the works of the candidate can be distributed in the following research areas:

- * Measuring transducers for registering biosignals;
- * High-bit recording and generation of ECG signals;
- * Adaptive filtering of electromyographic noise in ECG signals;
- * Filtering network interference from ECG signals;

The following can be listed as applied scientific contributions:

- * differential and asymmetric amplifiers of biosignals without a reference electrode, schematic solutions for simultaneous recording of a high-quality electrocardiogram, phototransducer for recording peripheral pulse from the human forehead area;
- * development of an adaptive LPF, self-tuning to the frequency spectrum of the ECG waves, locally adaptive algorithms for "myriad" filters with adaptation of the "myriad" linearity parameter K;
- * a software phase-locked loop (PLL) was designed, generating a reference signal synchronous with the mains supply for medical purposes.

Applied contributions are:

- * comb filters based on first difference and averaging;
- * filter through a mixed analog-digital solution for automatic balancing of the impedance bridge formed by the electrode impedances and the input impedances of an amplifier for biosignals;
- * a 16-channel module was developed for recording ECG signals with high resolution: 24-bit amplitude resolution and sampling frequency of 2 kHz;
- * an ECG signal simulator was developed, which is an ECG device tester that generates high-resolution signals by direct digital-to-analog conversion of computer data.

3. Significance of the contributions to the science and practice

The proposed scientific and scientific-applied contributions are a proof of the candidate's successful scientific-research activity. The field of application of the proposed methods and electronic devices is in medicine, and they are essential for diagnosing people's health. Scientific publications are well-written and structured, and demonstrate an enviable knowledge of electronics. For the implementation of the experiments, hardware, software for the hardware and application software were developed.

The significance of the contributions to science and practice is great, as the proposed circuit solutions are useful in electrocardiography (ECG) and electromyography (EMG), filtering the mains voltage in medical equipment, removing DC offset and low-frequency noise in amplifier circuits, measuring bioelectric impedance and heart rate recording by photoplethysmographic signals.

4. Critical remarks and recommendations

I have no critical remarks about the candidate. I recommend her to publish several single-author articles after taking the title of "Associate Professor", which will help her in the procedure for the next academic level.