

Remote detection of human psycho-emotional state with the use of electro-photonic imaging method

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Present work was focused on the remote registration of emotional state of a group of people and on study of its influence on the surrounding space with the use of electro-photonic imaging/gas discharge visualization method. Special procedure for conducting measurements and processing of the obtained results has been developed. This methodology was used for theatrical performances and opera concerts, seminars and lectures, and during group meditation.

Введение

Electro-photonic imaging or gas discharge visualization (EPI/GDV) method is used in different areas of scientific studies [1,2]. One of the new fields of study is registering of emotional state of people and its influence on the surrounding space [3-5]. Specially for such measurements KTI company (www.ktispb.ru) has developed and started serial production of a new device called “EPI/GDV Eco-Tester” and new antenna “EPI/GDV Sputnik” that provides maximum sensitivity and stability of the measurement system. “EPI/GDV Eco-Tester” device was designed and developed according to the recommendations for elimination of destabilizing factors during measurements with the use of EPI/GDV method [6]. Standard procedure for conducting measurements and processing of the results has been developed [7].

There are two main methods for measurement of emotions: “self-report”, when subjects define themselves what feelings do they have; and psychophysiological measurement, when alteration of physical characteristics (heart rate, skin conductivity, eye movements, facial expression, rarely – brain activity) as a result of emotionally coloured event are being measured. In

psychology (e. g. psychological qualimetry), neural sciences, and in machine based education researches there are methods of individuals' emotional state assessment [8-11]. However, there are no market available methods for remote monitoring of emotional state of a group of people. Research that is closest by the topic is related to investigation of energy-informational radiation influence on the aqueous solutions [12,13] (we know that air has relative humidity and our body consist of water for 50-70%).

Any group of people has its own set of properties and characteristics that distinguish it from other groups. One of the aspects that define a group is its emotional state. Any group like an individual has its own mood, emotions and predispositions [14,15]. To define the emotional state of a group of people not only at some concrete moment, but also to monitor it in time – in a process of some collective action, one need to have a special method that is able to objectively and remotely assess the emotional state of the group, and it will be possible to scientifically prove the obtained results. Developed methodology with the use of EPI/GDV technology makes one step forward to the solution of this task.

These investigations can be of an interest for psychology, sociology and energy practices (from the point of their influence on the state of a group of people and the surrounding space).

Experimental methods

Principle of electro-photonic images formation

Procedure of electro-photonic images (EP-images) formation with the use of EPI/GDV device is as follows. Metal cylinder (test-object) is placed on the transparent quartz electrode, the bottom surface of which is covered with a conductive transparent layer, on which high-voltage electro-magnetic impulses from the generator are being applied for some concrete period of time. Power and length of impulses is set by the operator from the computer. When the intensity of the field is high enough - between the test-object and the electrode

an avalanche and/or sliding gas discharge is formed, which characteristics depend on the properties of the external circuit – that is, the test-object, the wire connected to it, the antenna “EPI/GDV Sputnik”, and the space between the antenna and the ground. Spatial distribution of the discharge is captured by the specialized video-camera (CCD-camera) that is situated right beneath the quartz electrode. Video-converter transfers the captured image in the digital format to the computer for further processing. EP-images are processed in a specially developed software set that calculates different parameters of the images, such as area, average intensity of the glow, etc. EP-images parameters – area and average intensity – have the highest correlation with the physical characteristics of the external circuit, e.g., electrical capacity and resistance [16].

Experimental setup

Experimental setup in a schematic representation is shown on figure 1.

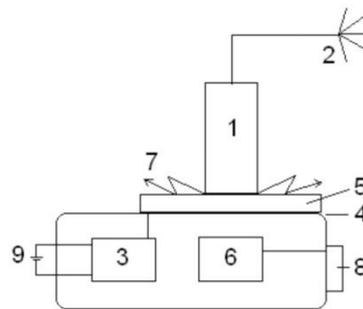


Fig. 1. Experimental setup scheme. 1 – metal cylinder; 2 – antenna “EPI/GDV Sputnik”; 3 – high-voltage impulses generator; 4 – transparent conductive layer; 5 – transparent quartz electrode; 6 – video-converter; 7 – gas discharge; 8 – memory stick; 9 – 12V accumulator battery

Experimental system can also be represented as an equivalent scheme of the coupled LC-contours (fig. 2) [2]. External circuit of the system (L_2 - R_0 - C_0) has some definite capacity and resistance to earth. Metal cylinder, wire and antenna “EPI/GDV Sputnik” doesn’t change their properties during the time of

measurements. The only part of the external LC-contour that change its properties during measurements is the space around the antenna – that is air and all the conductive objects in it. Depending on the fields of various natures in the surrounding space, chemical composition of the air and state of the conductive objects (e.g. people) situated close to the antenna characteristics of the external LC-contour will change, and hence parameters of the glow will also change.

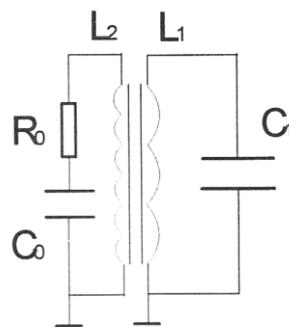


Fig. 2. Equivalent scheme of the experimental setup

Alteration of human's emotional state leads to alteration of: impedance of his body, field distribution around him, and chemical composition of the surrounding air. Thereby this system is sensitive to the alteration of the state of a group of people.

Processing of the data was conducted in the specially developed software program "GDV Scientific Laboratory" produced by "Kirlionics Technologies International"[®] company, after which data was processed in the Microsoft[®] Excel program.

During processing we have taken into consideration not only the absolute values of the EP-images parameters – Area and Average intensity, - but also their standard deviation in series.

During all the measurements we have monitored the following parameters: relative humidity, temperature, and pressure of the air.

Results

After the “EPI/GDV Sputnik” antenna has been developed we have conducted special experiments to find the difference in sensitivity of the system to some standard influences between usual radio-antenna (that comes together with the “GDV Fifth Element” attachment, and was used for space measurements and human emotions before) and the “EPI/GDV Sputnik”. Figure 3 shows the plots of the Area parameter of the EP-images in time.

In the case that is presented on the figure 3 the standard influence was presence of a man (on a distance of 1 meter from antenna) in the room where the experimental system was set. As one can see from the plots the “EPI/GDV Sputnik” antenna has higher sensitivity than usual radio-antenna.

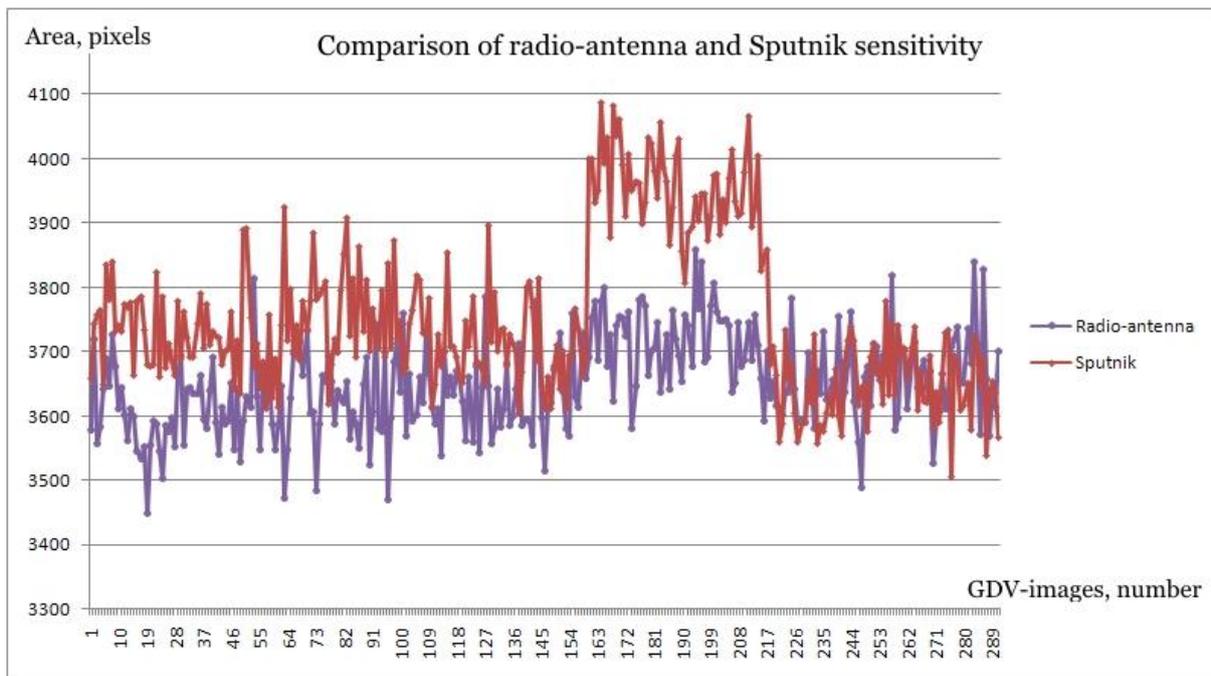


Fig. 3. Dependence of the Area parameter of the EP-images from time for a standard influence

Main advantages of the “EPI/GDV Eco-tester” device in measurements of space and human emotions are as follows:

- autonomous work without connection to the computer;

- works from 12V accumulator battery;
- writes all the EP-images to the memory-stick;
- space under the cover is continuously ventilated;
- test-object is firmly placed with special holder on the electrode that protects it from movement even during shaking.

Due to the abovementioned refinements “EPI/GDV Eco-Tester” device has the highest stability of work in comparison with all other EPI/GDV devices that also increases the sensitivity of the system.

This methodology was tested during theatre and opera performances, seminars and lectures, and also during meditation of a group of people [3-5]. In all studied cases we have found correlation between the signal and the emotional state of the audience.

Figures 4 and 5 show the results of measurements conducted in one of the laboratories of MIT University (Pune, India) on 20th of January 2011 during the demonstration of this technology. There were 12 people in the room.

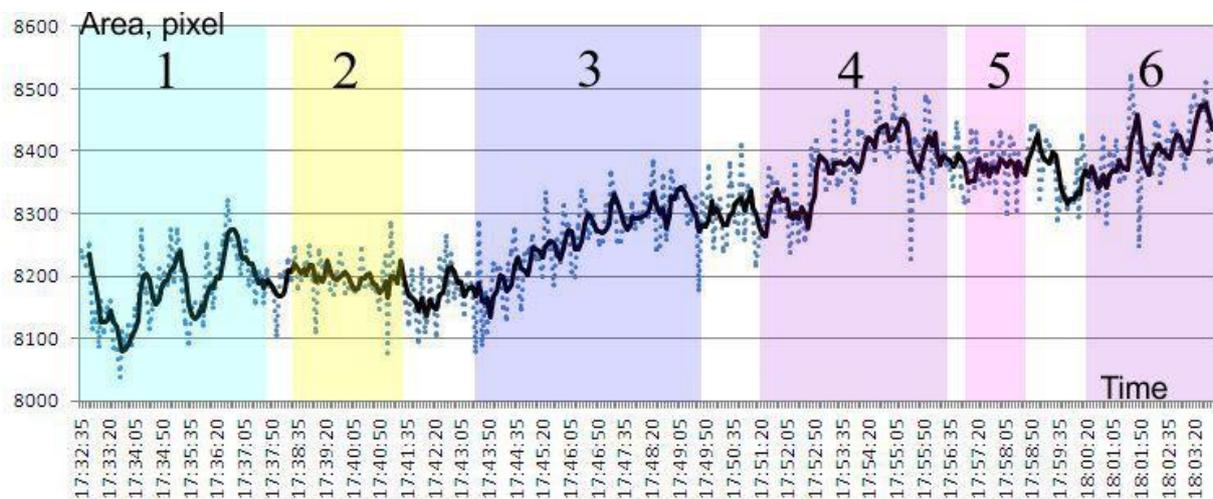


Fig. 4. Area parameter of EP-images variation in time. 1 – vivid discussions; 2 – silent tea brake; 3 – speech about technology; 4 – AUM invocation by several men; 5 – AUM invocation by a woman; 6 – AUM invocation all together



*Fig. 5. Standard deviation of Area parameter in time
(time schedule is the same as on fig. 4)*

The lowest values of standard deviation corresponds to the time when people were drinking tea or sitting silent, and the highest – to the lively debates and speech, singing and praying.

According to the abovementioned results we can conclude that the developed system and methodology of measurements and processing of data makes it possible to study the emotional state of a group of people that changes the state of the surrounding space.

Conclusions

Application of “EPI/GDV Eco-Tester” device together with the “EPI/GDV Sputnik” antenna allow to register and study the emotional state of people, and also their influence on the surrounding space. This methodology was tested during theatre and opera performances, seminars and lectures, and also during meditation of a group of people. In all studied cases we have found correlation between the signal and the emotional state of the audience.

The lowest values of the standard deviation of Area parameter (approximately from 20 to 40 pixels) corresponds to the calm state of people

present in the room. Hence the higher the standard deviation, the higher is the emotional stress of the people in the room.

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