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WEARABLE SYSTEM FOR MONITORING OF INTERNAL MICROCLIMATE CHANGES IN THE AIR GAP BETWEEN CLOTH LAYERS

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Smart Textiles could be used in a large field of studies and products that extend the functionality and usefulness of commonly used fabrics. Smart Textiles are textile products such as fibers and filaments, yarns together with woven, knitted or non-woven structures, which can interact with the environment and user. The convergence of textiles and electronics can be relevant for the development of smart materials that are capable in a wide spectrum of functions. It can be used in rigid and non-flexible electronic products nowadays. Smart textiles can be divided into four main subgroups:

- Passive smart textiles can analyze the environment and user by sensors;
- Active smart textiles can react to the condition or stimuli of the environment;
- Very Smart textiles can analyze, react and adapt behavior to the given circumstances;
- Intelligent Textiles are capable of responding or activated to perform a function in a manual pre-programmed manner [1, 2].

In the work, the use of the system for remote monitoring of changes in the internal microclimate in the air gap between cloth layers was proposed. The parameters of changes in temperature and relative humidity in the air gap between cloth layers were obtained. The results of the research are important for the prediction of comfort indicators and optimization of the quantitative and qualitative composition of sensors for the remote sensory system.

The block diagram of the moving objects survey through the WiFi network (a) and GSM module (b) (Figure 1) was used in the work. The left side of diagram (a) shows the measuring terminal, and the right shows the access point through which the data transferred to the Internet. Unfortunately, the range of signal transmission over the WiFi network is limited and does not exceed 100 m. Data (id, date, time, temperature and relative humidity) are documented by a super computer. The geodata comes from a dual-speed navigator. The data can be saved in flash memory, and during long transportation - to an external flash. Transmission on demand occurs periodically over a cellular channel or through open accessed WiFi points. In the case, if the terminal located outside of the cellular and WiFi networks area, it is proposed to use the VHF radio channel in

batch mode for data transfer to the cloud storage database. The structure of this solution is shown in Figure 2.

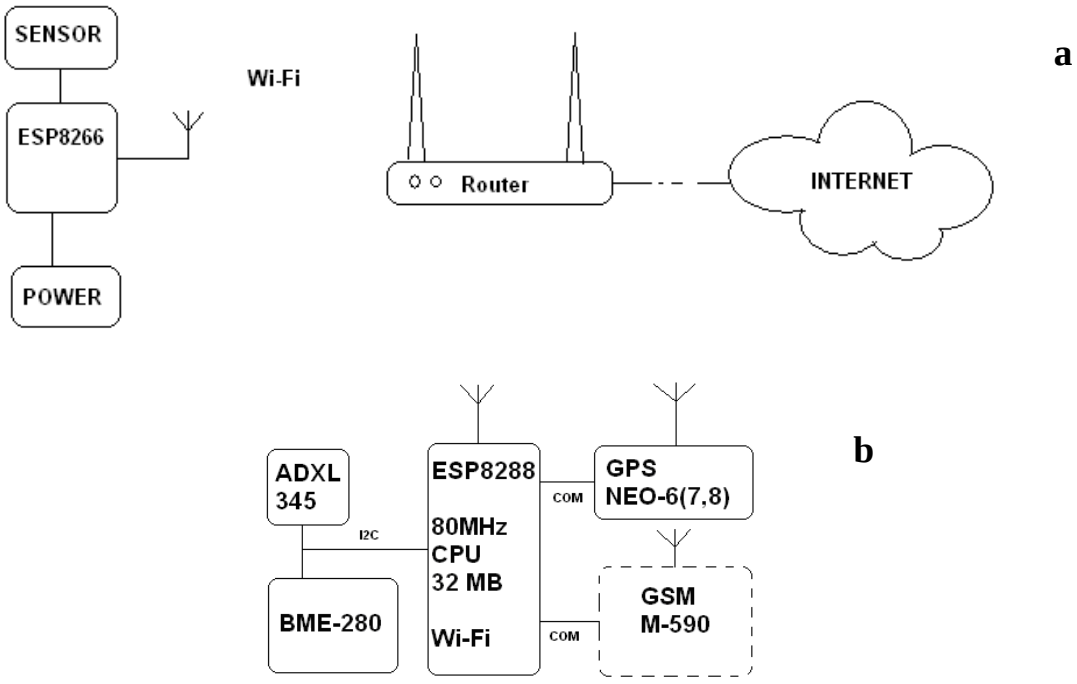

Figure 1 - The block diagram of the moving objects survey using a WiFi network (a) and GSM module (b)

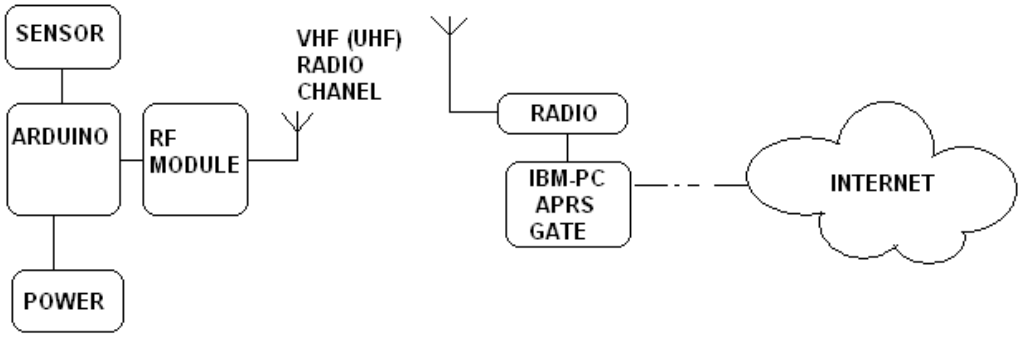

Figure 2 - Structural scheme of the system using the VHF radio network (range up to 100km)

Conclusions. The smart textile materials with the use of sensors and microcontroller equipment were proposed. The research results can be used to further improvement of clothing items and the development of new smart textile materials.

References

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