SYSTEM FOR THERMOGRAPHIC ANALYSIS OF BIOLOGICAL OBJECTS

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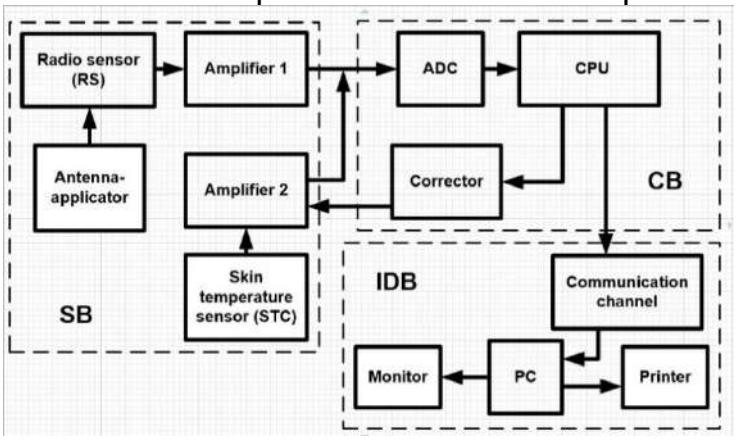
Qualitative characteristics of diagnostic devices based on thermography are temperature indicators of the investigated area and temperature cards in the form of an image. Mathematical methods of modeling and digital processing are interpolation and averaging of temperatures; selection of boundaries of abnormal zones; finding gradients, confidence intervals of temperature distribution; construction of histograms and isotherms; correlation and scatter diagram; smoothing filtering and others. Considering that the cost of non-cooled matrix IR systems is 2-3 times lower in comparison with cooled IR systems, it seems appropriate to develop electronic equipment, i.e. microprocessor control systems for the IR diagnostics process. Based on the analysis of technical medical and technical requirements, the requirements for the functional scheme of the thermographic control system were formulated, which is shown in the figure and conventionally divided into three blocks: computing block, sensor block, information display block. When developing a system for thermographic analysis of biological objects, a solution with a wireless ESP32 SoC module and an infrared thermal imaging camera was proposed. The sensors (skin temperature and radio sensor) receive infrared rays and radio waves received from the patient, the intensity of which is proportional to the temperature of the emitter, the voltage at the output of the sensors is 1-5 mV and depends on the overall temperature.



Figure

The value of the output voltage from the sensors is small, therefore, amplifiers with a gain factor of *Ku* = 1000 are needed for operation of the ADC with an input voltage of 0-5 V. The amplified signal enters the 8-bit ADC, where it is converted into a digital code. Next, the signal is processed by a computer and through the communication channel enters the PC, which serves as a means of displaying information, on the display of which a complete thermographic map of the patient is displayed. The ADC, the calculator is implemented on the basis of the AT90S8535 Arduino microcontroller.