

CRD

Compact Radiation Detector

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Abstract: CRD is a wireless personal radiation detector designed for easy portability and collaboration with mobile devices such as smartphones. By communicating via Bluetooth and applications on the Android system the user has easy access to data and statistics on radiation doses what he received.

Applications: Our detector could be used as a warning device against contaminated objects, areas and as a personal dosimeter. The device should be still in close proximity to the user, so that, we decided to design the CRD in the form of a wrist watch. This form provides a comfortable and unobtrusive movement of the device along



Radiation

with the user. The device fastened on the wrist is exposed to approximately the same radiation as was taken by user. Additionally it is located close to the objects that you can touch and warn the user about possible contamination of these items. Located LEDs on the front panel of the watch, display current dose of radiation and warn user about exceeding the allowable radiation intensity.

To be able to place the radiation detector in this wrist watch, it was necessary to apply a small, mechanically resistant radiation sensor which does not require high voltages. Commonly used Geiger counters require the use of high voltages,



Sensor/Device

they have glass elements sensitive to shocks and big sizes. Therefore a semiconductor sensor, white matrix of PIN diodes was used. From the variety of available sensors, we selected the Teviso RD3024 sensor. Its property are low operating voltage, very low current consumption ($400\mu\text{A}$), high sensitivity ($6\text{ cpm} / \text{mSv} / \text{h}$), the lack of sensitive elements and the relatively small size. Low supply voltage of the sensor enabled us to apply a standard 3V battery to supply our devices. Small power consumption is a very important advantage when using battery power and continuous operation of our device.



Communication

As a wireless communication standard we chose Bluetooth 4.0 low energy. From the available solutions on the market we chose the Blugiga BLE113 module, because of its very small size and low power consumption. This module is equipped with a processor 8051 programming the language BGscript. Data from the detector can be sent to mobile devices with Android system. Using specially prepared application, you can view graphs and statistics of the dose of radiation. Using the application, you can observe data such as the monthly dose, weekly, daily absorbed radiation.



Data/Statistic

Marketing: Currently on the market, there is no such a compact and multifunctional device as ours. There is also no device utilizing the potential of mobile devices like "smartphone" and the wireless communication system. The present devices are either very large, heavy and high power consumption or only allow for measuring the dose of radiation with a very long period of time. The CRD has a very high potential for application. There is no problem to apply everywhere where people are exposed to ionizing

radiation and where a rapid reaction and detection of contamination. Our radiation detector can successfully be applied in the control of luggage and passengers at airports and border crossings, checking mail, the protection of the uniformed services and the army, protecting people exposed to elevated radiation in medicine and industry or detection of contaminated areas and items affected by radioactive contamination.

Disaster



Medicine



Army



Security



Radioactive industry

