

Radioactive source simulator for radioprotection training

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In many training, the simulation becomes essential. For example, in firearms training or aircraft pilots training and even in medical procedures [1], the simulation for training is very useful, so the principle is very well established.

We have many reasons for the use of simulation: to reduce cost; technological difficulty in providing training without a simulator; to reduce strain on the trainee. We have a more specific reason in the case of radiation protection training, where ionizing radiation sources are necessary: the environment of the trainee is fundamentally hazardous and international regulations forbid any unnecessary exposure of staff [2] – even during training. A further difficulty in detection training with real radiation sources is the amount of bureaucracy required to move sources to field exercise areas. The SEINS developed a system for simulation of the use of radiation monitors – Figure 1.



Figure 1. Devices developed

Through the radio frequency communication between a device, simulating a radioactive source, and another device, simulating a radiation monitor, it is possible to demonstrate the situation of search and approach of radioactive sources. The idea is to use the system also in demonstrations of fairs and exhibitions, especially to the younger audience, showing that all electromagnetic waves, such as radiofrequency and gamma radiation, have an inverse proportional relationship between the power received and the distance. The same idea will be used in the future to develop a system for training in radioprotection without the use of radioactive sources, avoiding unnecessary exposure in these situations.

The system works as follows: a low-intensity radio signal, in the range of 27MHz, is emitted by the transmitter located in the radioactive source simulator. The signal is then picked up by the receiver located on the radiation monitor simulator. The intensity of this signal is then measured and displayed through a led scale and a digital display. A buzzer also simulates the approach of the radioactive source, increasing the frequency of the sound, as it occurs in radiation monitoring equipment.

Training simulations are good opportunities for closing knowledge gaps and helping employees improve their skills [3]. They are interactive and immersive and mimic real situations, helping trainees effectively learn much faster.

Radiation simulation instruments could be used for training workers in nuclear facilities, homeland security, defence and emergency services. Simulation use safe, transferable and invisible radiation using radio frequency technology to demonstrate the concept of time, distance, activity and shielding in radioprotection.

References

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