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SUNLIGHT SIMULATOR IN ISOLATED SPACES

**Abstract**

Light is the most powerful synchroniser of human homeostasis controlled by internal biological clock. In an extraterrestrial environment, the exposure to the sunlight is limited because of harmful radiation. The lack of sunlight may induce Seasonal Affective Disorder (SAD), manifesting through fatigue, concentration and memory problems, decreased mood and obesity. Additionally, in space conditions circadian clocks of astronauts are desynchronised, what causes for example insomnia and immune problems. Vitamin D, as well as many others critical for health molecules, cannot be synthesised naturally in the body like it occurs on the Earth because of lack of proper wavelengths in administrated light spectrum.

In this paper we discuss the importance of considering time in design of lighting system as the crucial element to recover natural environment conditions in isolated interior spaces. What is unique in proposed solution, is creating visible and safe non-visible solar spectra programmed accordingly to needs.

We describe a prototype of LED lighting system for an artificial environment in order to influence an astronaut's perception of time and overall health. We present data from experiments on plants, cockroaches and preliminary data from humans isolated during analog simulations in Analog Astronaut Training Center - a new habitat in Poland.