**Cyber-physical security zone violation reporting system with a combination of heat and night vision**

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Abstract

 In this paper I research the relevance of the use of thermal and night vision in the military field and present how thermal and night vision works.

Кеуwords: paper, thermal, night, vision, security, military.

Introduction

 The rapid development of autonomous robotic devices over the past decade has forced most analysts and scientists to be convinced that the armed forces are facing a major change in technology, doctrine, and organization. But few have decided how big this change will be and in what areas the change will take place. It happened that robots were doing repetitive and manual tasks, mainly replacing physical human work. However, this latest version of automation is driven by new advances in cyber-physical system. This can not only change what military does, but also how it is organized.

Night vision is the ability to see in low light. By any biological or technological means, night vision becomes a possible combination of two approaches: a sufficient spectral range and a sufficient intensity range.

 Emissivity is a term that is often misunderstood and misused. It represents the ability of a material to emit thermal radiation and is the optical property of a substance.

 A sufficient intensity range is simply an opportunity to see with very little light. Many animals have better night vision than humans, the result of one or more differences in the morphology and anatomy of the eyes. These include a larger eyeball, a larger lens, a larger optical aperture (pupils can extend to the physical limit of the eyelids), more rods than cones (or exclusively rods) in the retina, and tapetum lucidum.

 An improved intensity range is achieved through technological means through the use of an image amplifier, enhanced CCD multiplication or other array of very low noise and high sensitivity photodetectors.

 All photoreceptor cells of the vertebrate contain molecules of photoreceptor protein, which is a combination of protein photopsin in cells of color vision, rhodopsin in cells of night vision and the retina (a small molecule of photoreceptors). The retina undergoes irreversible change of shape when it absorbs light; this change causes a change in the shape of the protein that surrounds the retina, and then the change induces a physiological process that leads to vision.

Thermographic cameras usually detect radiation in the far infrared range of the electromagnetic spectrum and produce images of this radiation called thermograms. Because infrared radiation emits all objects with a temperature above absolute zero in accordance with the law of black body radiation, thermography allows you to see the environment with or without visible illumination.

Thermography has a long history, although its use has increased dramatically with commercial and industrial applications over the last fifty years. Firefighters use thermography to see the smoke, find people and locate the basis of the fire. Maintenance technicians use thermography to detect overheating connections and power line sections that are a sign of future malfunctions. Technical builders can see thermal signals that indicate heat leakage during defective thermal insulation, and can use the results to improve the efficiency of heating and air conditioning systems.

Conclusion

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