

论文

基于生理信号的驾驶疲劳声音对策有效性实验

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摘要:

为了有效减轻驾驶疲劳、减少交通事故,研究了脑电信号(EEG)和心电信号(ECG)随驾驶时间的变化规律,分析EEG和ECG的原始数据与指标之间的相关性,用主成份分析法确定了驾驶疲劳综合评价指标.采用正交实验法,在驾驶模拟舱内验证声音刺激作为驾驶疲劳对策的有效性.研究表明:驾驶员在疲劳状态下,对单一声音刺激存在警觉反应;声强和刺激间隔时间影响显著,频率和刺激时间影响较小,且声强70 dB、频率5 800 Hz、刺激时间7 s和刺激间隔时间30 s的声音对策减轻疲劳的效果最好.

关键词: 驾驶疲劳 声音对策 驾驶模拟 EEG ECG 综合指标

Test on Effectiveness of Sound as Countermeasure Against Driving Fatigue Based on Physiological Signals

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Abstract:

In order to mitigate driving fatigue and reduce traffic accidents, a study on the variation law of electroencephalograph (EEG) and electrocardiograph (ECG) with driving time was made in a driving simulator. The correlation between the original data of EEG and ECG and each indicator for assessing driving fatigue was analyzed, and the overall index of driving fatigue was determined by principal component analysis. An orthogonal experiment was carried out in the driving simulator cab to validate the effectiveness of sound stimulus as a countermeasure against driving fatigue. The results show that drivers in fatigue have an alerting reaction to the single sound stimulus; stimulation interval and sound intensity have a significant influence on driving fatigue, but stimulation time and sound frequency have a weak influence on driving fatigue. The best effect in alleviating driving fatigue was achieved when the sound intensity was 70 dB, the sound frequency 5 800 HZ, the stimulation time 7 s, and the stimulation interval 30 s.

Keywords: driving fatigue sound countermeasure driving simulation EEG ECG overall index

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