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Assessment of Then Freeze Probing and Real-Time-Probing Strategies for Situation Awareness Evaluation in Pedestrian Environments

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Abstract

The surroundings has an impact on a pedestrian's safety. Because people walk often during the day, there is typically a reduction in pedestrian awareness. Situation Awareness (SA) tests can assess a pedestrian's capacity to respond to their surroundings. This is a reference to the significance of being aware of the SA of pedestrians using reliable measuring techniques. This study compares the freeze probing and real-time probing approaches to assess SA measurement methods based on how well they capture SA in a pedestrian environment. Eleven pedestrians (7 men) with an average age of 22 (SD 1.3) years and daily walking habits of 15 (SD 8.5) minutes participated in the study. A video of a person using a treadmill with three speed settings was shown to the participants. In several settings, SA was measured via frozen and real-time probing. Based on spoken procedure, performance was assessed. Real-time probing has more sensitivity but higher intrusiveness issues. This probe exhibits higher predictive outcomes in low workload situations, which is consistent with the features of the pedestrian domain, based on the regression results between predictors in the form of SA scores and performance as dependent variables. Real-time probing is thought to be more efficient for SA measurement demands in pedestrian contexts that are often straightforward, steady, and do not result in significant workloads due to its benefits. In order to improve the notion of SA and create new designs or procedures in the pedestrian environment, an effective assessment method must produce an accurate measure of SA score.

Introduction

As the incidence of fatalities and serious injuries from pedestrian-related traffic incidents rises, pedestrian safety has become a major concern. Anxiety and unconsciousness are linked to over 50% of pedestrian fatalities. Reduced pedestrian awareness is typically caused by regular repetition of walking without much cognitive thought. This automatic behavior raises the possibility of pedestrian insecurity. Numerous factors affect how safe a pedestrian environment is for its users. In the same way that the idea of Situation Awareness (SA) refers to knowing what is happening in an area, comprehending those aspects for the present and future, pedestrians must comprehend these factors and anticipate their possible threats in order to walk safely. The individual level of SA becomes crucial when building a new system or technique in a certain domain. This demonstrates the significance of researching SA pedestrians to the country's ecology. The capacity of an operator to manage the environment may be assessed using SA

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measures. Clear information on the actual consequences of the established design idea may be obtained by SA measurements. Therefore, the SA level must be precisely recorded by the researcher and the designer. The fundamental step in supporting such efforts is to offer a valid and trustworthy measuring method and to show sensitivity to variations in design concepts. Freeze probes and real-time probes were the SA measuring techniques most often employed in earlier investigations. With freeze probes, the simulation is terminated at a predetermined point in order to gather information regarding the subject's perception of the present state. Then, depending on real circumstances, the subject's viewpoint is contrasted with the outcome. The most used freeze-probing method is Situation Awareness Global Assessment Technique (SAGAT). This approach was discovered to be a considerate, trustworthy, and SA-predictive metric that can be applied in a variety of domains and experimental scenarios. However, some studies also point out that these methods are criticized for interfering with the execution of core tasks and necessitating task simulation because it is hard to halt the job immediately in the field. Real-time probes, on the other hand, capture measurements as the subject continuously completes the primary job, either in real time or through simulation. The Situation Present Assessment Technique is the most used real-time probing method (SPAM). This approach may be applied immediately in the field or in real-world settings where work cannot be stopped without time stoppage while measuring SA. However, asking questions will make the subject's job burden heavier if it already has a large task load. The inquiry posed may also serve as a prompt for the subject to review the data shown on the monitor. So it is believed that the true SA will not be measured. When the SA measuring method is able to identify changes in therapy between measurements, it is considered to have a high level of sensitivity. Variating the construct to see how effectively the measurement picks up changes in those variations is a frequent strategy to evaluate the sensitivity of the SA measuring method. However, SA cannot be changed directly in an autonomous manner. As a result, variety is achieved through the manipulation of study studies. The efficiency of SA approaches has often been investigated in domains that differ from pedestrian contexts. In these situations, domains are frequently changing and extremely unclear. Operational complexity is the major duty in the environment, requiring operators to evaluate different information at a certain moment to deal with unforeseen technological failures. Previous researchers claimed that there had not been a consensus on measures that were widely accepted.

Conclusion

SA measurements are taken to record the actual consequences of an environment's design idea. SA levels should be correctly captured by researchers and designers using the right measurement techniques. In order to measure SA, prior studies frequently used freeze-time and online probes with various capabilities and viewpoints. The study assessed the two methodologies' efficacy when used in a pedestrian area. The SAGAT technique and SPAM were used to illustrate freeze-probing and real-time probing, respectively. Overall, the findings indicated that in a pedestrian environment, SPAM had more sensitivity than SAGAT. However, SPAM generates greater intrusiveness issues than SAGAT, particularly because of the secondary task effect it has. Both SAGAT and SPAM have the ability to anticipate performance, however SAGAT performs better in pedestrian environments with larger workloads. Based on its benefits, SPAM is thought to be more appropriate for SA assessment requirements in pedestrian contexts that are often straightforward, steady, and do not result in significant workloads.