

Flight Simulation; Virtual Environments in Aviation

Alfred T Lee

By Niels ten Berge

Nowadays, pilots train in highly sophisticated flight simulators and they are examined in these as well. The reasons for using these simulators are: lower costs and increased safety. Moreover, the quality of these simulators has increased, mainly due to the use of satellite images. Most pilots admit that flying in a flight simulator approaches reality. In Tee's book, a more scientific approach is used to find what influence flight simulators have on modern aviation. In the first chapters, the author describes the machine itself, such as the technology and the perception of the pilot towards it. The second part of the book, human factors and the simulator are discussed.

When the author gets more in-depth, it becomes clear that it is a challenge to mislead the pilot's perception of flying on the ground. It is a combination of visual effects, sound effects, communication and the whole body motion. In the very latest simulators, the cockpit can be moved in many directions, and the throttle, rudders and yoke have a force-feedback system. The movements are related to the visual effects, such as the movements, pixels, color and details. Not only the sound of, for example, the engines and the instruments are important, but also the communication simulation between air traffic control and the pilot.

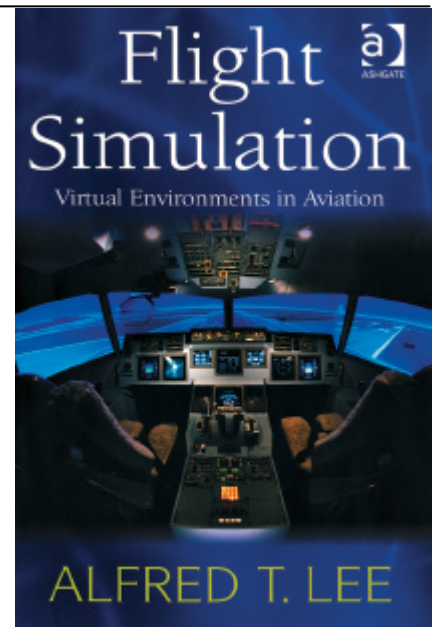
When developing a flight simulator, it is important to check whether it provides effective pilot training and whether it can perform the periodical professional check. So the goal of a flight simulator developer is to design an environment in which the pilot's behavior in the simulators is compara-

ble to the behavior in a real aircraft. The perceived fidelity between a real aircraft and a simulator determines the likelihood that the simulator will be an effective tool.

Besides the numerous advantages of using flight simulators, some limitations can be determined. These limitations are based on the technology-human gap. One of the biggest limitations is simulator sickness and is comparable to all other motion sicknesses. The gap between the motion and the perception of the body is so big that the body reacts to this gap. Another problem is the influence of the quality of the simulator on the pilot's motivation, because motivation falls when the quality perception is low. Other limitations are the incredible costs of developing a simulator, the technology interdependence with other electronic suppliers and the heavy regulations in this field.

The author mainly focused on the simulator-pilot relationship. The importance of flight simulators in research is outlined in the final chapter. For costs and reality purposes, simulators provide a good environment to do research in the fields of procedures, human factors, accident investigations, etc.

Alfred Tee tried to describe the flight simulator in the triangle 'technology-research-human perception'. It gives a complete picture of role of the flight simulator, with its limitations. The technology part is written clearly and background knowledge is less important. In my opinion, the relationship with the human factors lags behind the technology part. I



believe that research and simulators deserve more attention to complete the entire picture.

Overall, the book *Flight Simulation* is an easy-to-read book for anyone who is interested in flight simulators from a technology point of view, to the human-factor perspective. The author opened the gate to the wonderful world of flight simulators.

About the Author

Alfred T. Lee is President and Principle Scientist with Beta Research, Inc., responsible for initiating, planning and conducting human factors research projects supporting the design and evaluation of aerospace, medical and computer technologies for corporate and government organizations. He used to be senior research psychologist at NASA Ames Research Center, responsible for initiating, planning and conducting human factors research programs in aviation and aerospace. Dr. Lee has conducted research in flight simulator design for more than 25 years and is a licensed pilot.

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About the book

Year of publication: 2005
Number of pages: 138
Published by Ashgate Publishing Limited in Hampshire, England
ISBN 0 7546 4287 9

