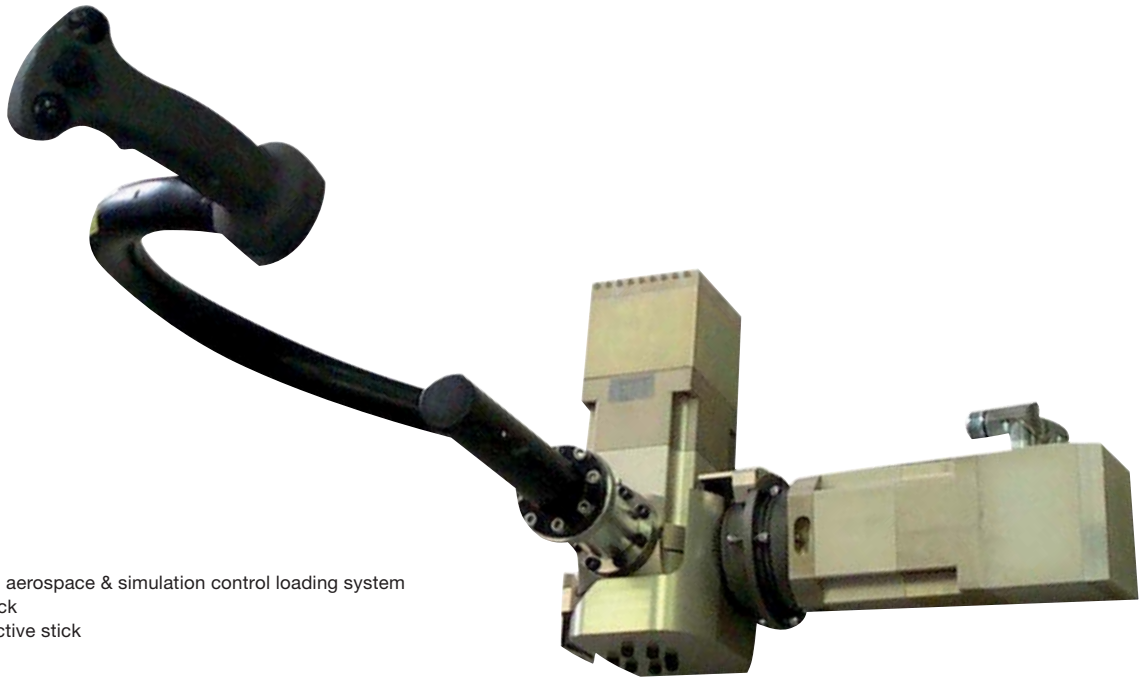


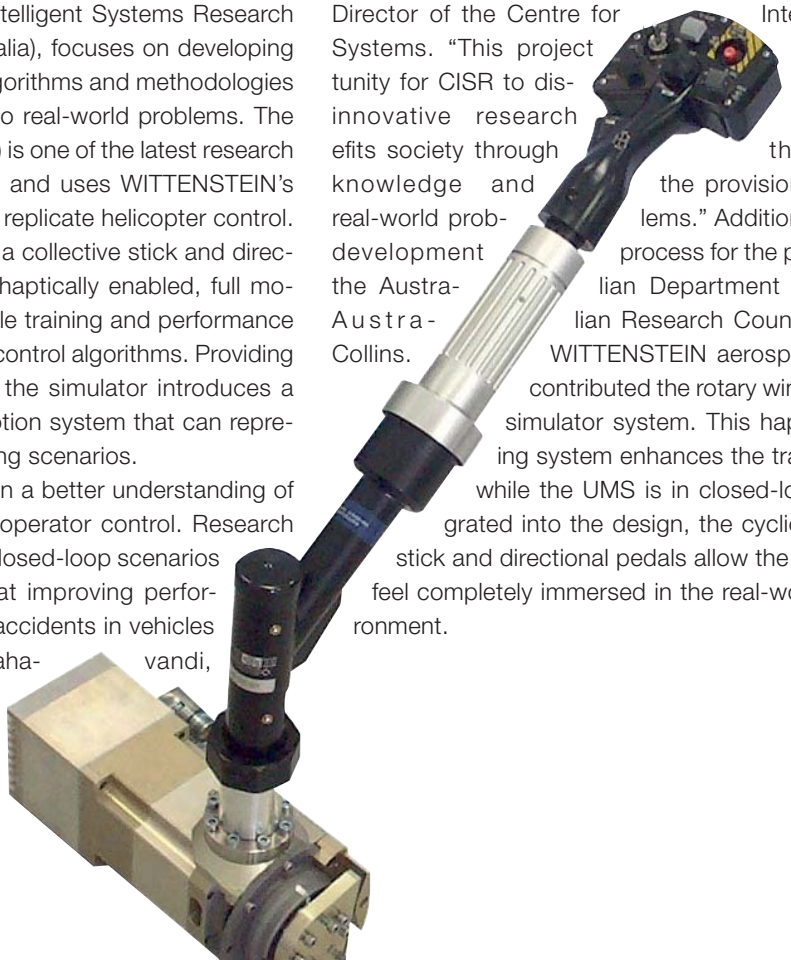
WITTENSTEIN aerospace & simulation control loading system
Top: Cyclic stick
Bottom: Collective stick

Haptic technology for flight training

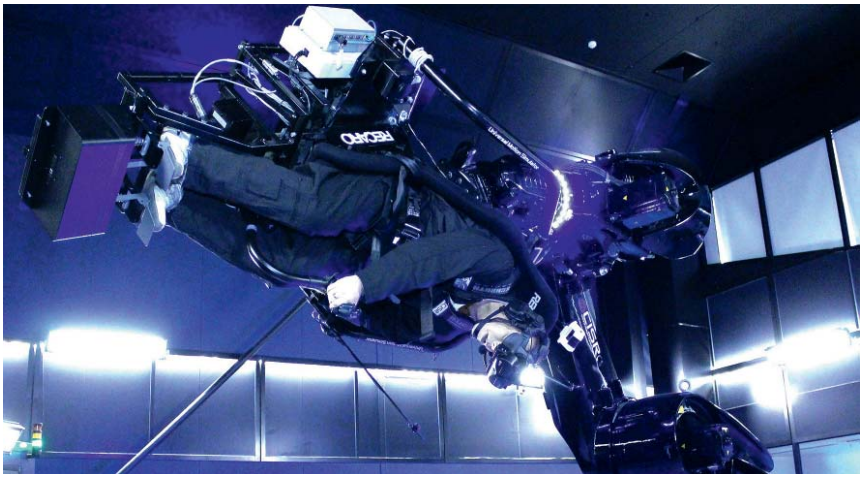
Researching and creating technology that positively impacts our environment takes more than drive and determination. It relies heavily on engineering expertise and collaboration, from the genesis of an idea to its realization for the greater good. WITTENSTEIN aerospace & simulation recognizes the hard work involved in cutting-edge technology and was inspired by the team at Deakin University when they started discussing their latest research project – the Universal Motion Simulator.

Deakin University's Centre for Intelligent Systems Research (CISR), based in Geelong (Australia), focuses on developing and analyzing state-of-the-art algorithms and methodologies that provide practical solutions to real-world problems. The Universal Motion Simulator (UMS) is one of the latest research projects from the team at CISR and uses WITTENSTEIN's control loading systems (CLS) to replicate helicopter control. This CLS includes a cyclic stick, a collective stick and directional pedals. CISR's UMS is a haptically enabled, full motion simulator for flight and vehicle training and performance analysis which uses customized control algorithms. Providing a realistic training environment, the simulator introduces a flexible, modular, high-fidelity motion system that can represent a variety of immersive training scenarios.

"The goal of this project is to gain a better understanding of vehicle and aircraft design and operator control. Research into user control with open and closed-loop scenarios will influence strategies aimed at improving performance and reducing the risk of accidents in vehicles and flights", says Prof. Saeid Nahavandi, Director of the Centre for Intelligent Systems Research. "This project is another opportunity for CISR to discover and deliver innovative research that directly benefits society through the creation of knowledge and the provision of solutions to real-world problems." Additional support in the development process for the project came from the Australian Department of Defence, the Australian Research Council and Rockwell Collins. WITTENSTEIN aerospace & simulation contributed the rotary wing control loading simulator system. This haptic control loading system enhances the training experience while the UMS is in closed-loop control. Integrated into the design, the cyclic stick, collective stick and directional pedals allow the simulator user to feel completely immersed in the real-world training environment.



The Universal Motion Simulator is a state-of-the-art platform for training and performance analysis. With its special kinematic interface, two axes of continuous rotation are permitted, providing realistic g-force acceleration.



The simulator is intended to be used in two modes: open-loop control and closed-loop control. When in open-loop control mode, the user is automatically flown through predefined paths and sequences, from beginner through to expert training modules. During closed-loop control, the trainee has full control of the rotary wing aircraft via the active technology systems provided by WITTENSTEIN.

“The cyclic stick, collective stick and directional pedals utilized in the Universal Motion Simulator represent excellence in engineering, showing the synergy of the core WITTENSTEIN elements of mechanical, motor, electrical and software technology”, Scott Metcalfe, General Manager of WITTENSTEIN aerospace & simulation, Inc., continues.

This system is a perfect component for the UMS because it possesses the key performance and aesthetic characteristics that align with the objectives of the simulator: reconfigurable, compact and haptically enabled. WITTENSTEIN’s active technology utilizes a unique control scheme which communicates the force realism to the operator. The feedback via the control loading system provides the user with full sensory involvement. Making the rotary wing flight conditions as realistic as possible benefits CISR with the most valuable data for analyzing training results.

Taking today’s technology and applying it to research that will positively impact the future shows the kind of engineering collaboration in which WITTENSTEIN will also participate in the coming years!