# SCIENTIFIC VISUALIZATION RESEARCH


Though off-road equipment is moving more and more towards autonomous control, practical implementation does not fully eliminate human interaction. Teleoperation is a promising compromise between manual control and fully autonomous operation. An especially compelling solution to teleoperation is the use of virtual reality to create a simulated yet realistic environment in which the operator can feel immersed, as if at the site, while still being located at a distance.

Our research presents a collaboration between Japan's National Agriculture Research Center (NARC) and Valparaiso University's Scientific Visualization Laboratory (SVL) to improve control of a remotely operated farm vehicle. Located in Hokkaido, Japan, the NARC semi-autonomous off-road vehicle utilizes GPS and heading sensors with a wireless network for data transfer. The vehicle has actuators for control of throttle, transmission, and auxiliary controls; all computer-controlled. The vehicle sends sensor status and receives actuation commands over the Internet.gs is pre-programmed into the system and the vehicle is rendered at its real-time pos

The SVL's stereoscopic 3-D virtual reality display system located in Valparaiso, Indiana, receives this information over the Internet in real-time and allows the user in the SVL to visualize and control the operation of the vehicle in Japan. A 3-D model of the terrain and buildinition. The system allows the user to have several views, such as cockpit, bird's-eye, and aerial. Using a handheld controller, the user is able to start the engine, sound the horn, activate the blinkers, control auxiliary hydraulics, and control the speed of the left and right tracks of the vehicle.

Environment Identification Technique using Hyper Omni-Vision and Image Map Presented at 3rd International Federation of Automatic Control International Workshop on Bio-Robotics, Fall 2006. Valparaiso University Tests Vehicle Operated Through a Virtual system InsideIndianaBusiness.com Report Valparaiso University College of Engineering Recruiting Postcard Use of Virtual Reality for Teleoperation of Autonomous Vehicles Presented at National Conferences on Undergraduate Research, Fall 2007. Presented at American Society of Agricultural and Biological Engineers Biological Sensorics Conference, Summer 2007. Presentation on Use of Virtual Reality for Teleoperation of Autonomous Vehicles (MS PowerPoint) Presented at National Conferences on Undergraduate Research, Fall 2007. Presented at American Society of Agricultural and Biological Engineers Biological Sensorics Conference, Summer 2007. 2007 Valparaiso University Celebration of Undergraduate Scholarship poster (MS PowerPoint)