

WTI Human Factors Research Facilities

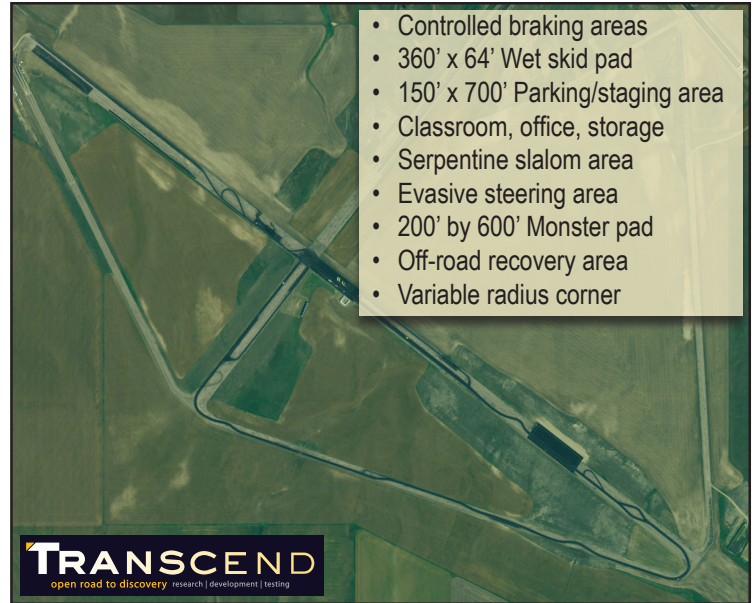
The Western Transportation Institute (WTI) is dedicated to understanding the role of society and the driver in fatal rural traffic crashes and developing driver support system to improve traffic safety. This research requires an integrated set of research facilities to support the range of research methodologies that a multi-disciplinary approach to understanding and improving traffic safety requires. As shown below, WTI has a comprehensive range of facilities to support traffic safety research throughout the entire design, development, and evaluation cycle of producing usable and acceptable traffic safety interventions.

Naturalistic Fleet

Western Transportation Institute received a \$535,000 grant awarded by the M.J. Murdock Charitable Trust, that will allow the institute to purchase a fleet of vehicles instrumented to collect data on driving behavior and vehicle response during test track and naturalistic studies. This vehicle-based data is supported by two portable Infrastructure-Vehicle-Infrastructure (IVI) data collection systems that record and transmit data on environment, road and traffic conditions. In addition, these data are supplemented by data from eye-tracking systems and physiological data recording devices. All these data can be integrated and recorded by specialized software for coding behavioral and event-based data.

Test Track

The TRANSCEND research test track center in Lewistown Montana is currently being expanded by WTI to support a broad range of vehicle and infrastructure based rural transportation research. The new expansion includes vehicle garages, laboratory space, weather generation equipment, and a communication backbone to support VII and VIV application research. This facility will support field research and quasi-controlled experiments including the assessment of system concepts.



Simulation Suite

WTI currently operates a suite of four driving simulators covering a wide range of fidelity. This suite represents the largest range and most versatile and advanced university funded driving simulation capability in North America. This versatility and range of capability provides for the appropriate matching of simulation fidelity to research question complexity. Recent efforts to calibrate and validate the driving simulator

ECOLOGICAL VALIDITY

Simulation



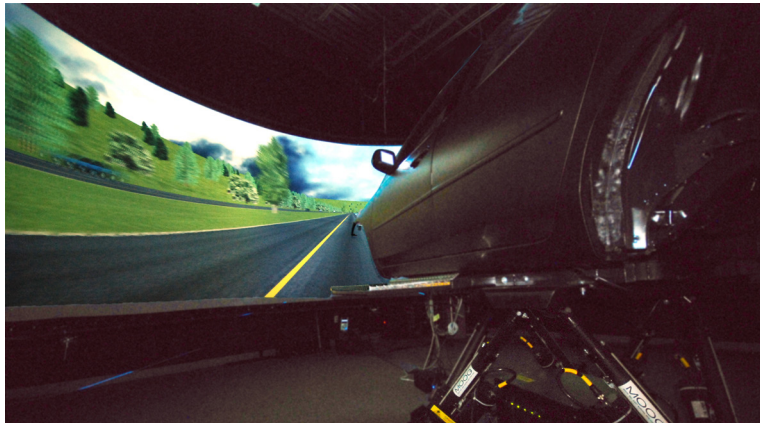
TRANSCEND Test Track

Naturalistic

to real world driving ensures the validity of this research tool for ethical exposure to risk factors, visualization of system concepts, realistic interaction with near-crash events, and the reliable control of relevant scenario conditions. Controlled test-track studies and naturalistic on-road studies are then used to validate and extend research conclusions with prototype and deployable systems.

Contact: Nicholas Ward, PhD

Western Transportation Institute; College of Engineering, Montana State University
 Ph: (406) 994-5942 Email: nward@coe.montana.edu

	Desktop (2)	Fixed Base	Motion Base
			
Channels, projection / screen type	1 Channel - 22" Widescreen LCD Monitor	5 Channel - faceted screen consisting of 5 40" Rear Projection Screens	8 channel - 240 degree seamless cylindrical screen forward projection. Canon SX7 Projector (4000 Ansi-lumens/1000:1 contrast ratio).
FOV	22" Widescreen LCD Monitor	155 degree FOV	240 degree horizontal x 42 degree vertical; sideview is direct view LCD in side view mirror housing; rear view is actual mirror reflecting a rear mounted screen projection (42 degree FOV)
Resolution		Each monitor is SVGA (800 x 600) < 2.325 arc minutes / pixel	< 2.6 arc minutes/pixel 1400 X 1050
Refresh Rate	60Hz	60 Hz	60 Hz graphics update
Anti-aliasing	8x FSAA (Full Scene Anti-Aliasing)	8x FSAA (Full Scene Anti-Aliasing)	8x FSAA (Full Scene Anti-Aliasing)
Transport Delay	Total transport delay from driver input to last display pixel drawn < 80 ms	Total transport delay from driver input to last display pixel drawn < 80 ms	Total transport delay from driver input to last display pixel drawn < 80 ms
Sounds	5.1 Sound System. Engine sounds and wind sounds are scaled by vehicle speed. Autonomous traffic sounds are scaled by distance and speed.	5.1 Sound System. Engine sounds and wind sounds are scaled by vehicle speed. Autonomous traffic sounds are scaled by distance and speed.	External sound system based on Logitech Z-5500 505 Watts, 5.1 system. For engine sounds and wind sounds scaled by vehicle speed as well as autonomous traffic sounds are scaled by distance and speed.
Motion	Fixed	Fixed	Ability to run with and without dynamic motion. Moog Model 6DOF2000E Motion Base 6 dof: Pitch, roll, yaw, heave, surge, sway
Displacement	Fixed	Fixed	DOF Surge: ± 0.25 m, Sway: ± 0.25 m, Heave: ± 0.18 m, Roll: ± 21°, Pitch: ± 22°, Yaw: ± 22°.
Acceleration (long, lat, vert)	NA	NA	Surge: ± 6 m/s ² , Sway: ± 6 m/s ² , Heave: ± 5 m/s ² , Roll: ± 500°/s, Pitch: ± 500°/s, Yaw ± 400°/s
Speed (Roll, Pitch, Yaw)	NA	NA	Surge: ± 0.50 m/s, Sway: ± 0.50 m/s, Heave: ± 0.30 m/s, Roll: ± 30°/s, Pitch: ± 30°/s, Yaw: ± 40°/s
Cab(s)	None	1/4 cab Saturn sedan	Impala Sedan, Chevy Silverado Pick up, Isuzu N-Series commercial truck cab
Dash Board	None	Standard dashboard	Virtual Dashboards (licenses for Altia Faceplate and Altia Designer to develop custom gauges and dashboard configurations)
Steering	Logitech MOMO pedal set	Steering uses pre-existing cab.	Steering uses the factory steering system. Steering model calibrated to real world steering data obtained with same vehicle type under actual driving conditions.
Brake Pedal	Logitech MOMO pedal set	Factory brake pedal.	The factory brake by RTI. Custom spring and damper mechanical system has replaced the hydraulic booster in the cabs. The spring rates of the braking system are adjustable based on specific vehicles.
Gas Pedal	Logitech MOMO pedal set	Factory gas pedal.	Factory gas pedals
Driver Interfaces	Altia Faceplate and Altia Design software has been provided by RTI and Altia for custom gauge and Instrument panel interface design.	Altia Faceplate and Altia Design software for custom gauge and Instrument panel interface design; a haptic seat cushion is available.	Altia Faceplate and Altia Design software for custom gauge and Instrument panel interface design; center Stack Display in Impala is touch screen. Altia can be used to create custom touchscreen interfaces.
Other systems		Seeing Machine Eye tracking system.	Seeing Machine eyetracking systems integrated with real time object detection.