

## **VORTEX CHOSEN AS KEY COMPONENT OF NAVIGATION SOFTWARE FOR AUTONOMOUS VEHICLE**

*Red Team Racing has chosen Vortex for onboard path planning software of  
unmanned H1ghlander robot.*

**December 6, 2004 – Orlando, FL** – Today, at The Interservice/Industry Training, Simulation and Education Conference (I/ITSEC), CMLabs, the leading supplier of real-time physics based simulation software and services, is proud to announce that Red Team Racing has chosen Vortex as a key component for the navigation software of their next generation unmanned vehicle being groomed to participate in a desert race for robots on Oct. 8, 2005.



Vortex will be integrated into the onboard navigation software of the H1ghlander robot, an autonomous vehicle that has been entered in the DARPA Grand Challenge 2005; which will take place in desert terrain somewhere in the southern United States.

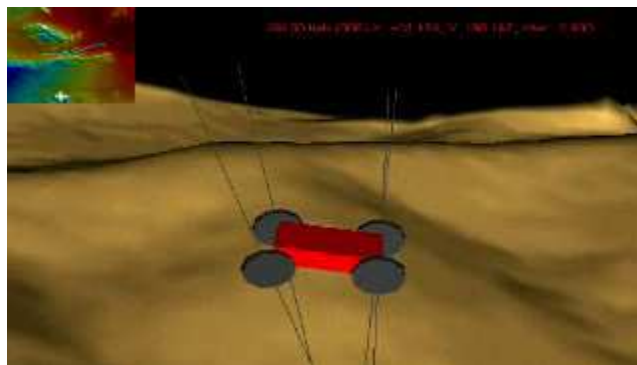
A collaborative alliance of for-profit companies, non-profit organizations, and individuals led by the Robotics Institute of Carnegie Mellon University, the Red Team is the leading contestant in the DARPA Grand Challenge 2005. In the initial race, which took place on March 13, 2004, , the Red Team established itself as a major contender when their vehicle traveled 7.4 miles – faster and farther than any of the 12 other teams. For the coming year’s race, the Red Team has outfitted an H1 Hummer vehicle with the latest technology to become the H1ghlander, one of the

most advanced autonomous ground vehicles ever built. In order for the unmanned robotic vehicle to safely maneuver the off-road terrain and complete the course, it requires state-of-the-art path planning and navigation software. Vortex, developed by CMLabs, has been selected as an integral component of both the pre-planning software and the onboard navigational tools.

Vortex is a development platform for modeling vehicles, machines and robots for realtime simulation. It is able to accurately simulate the Highlander robot negotiating extreme terrain, and help the autonomous vehicle determine the most optimal route. Based on its performance as a path-planning tool in the Grand Challenge 2004, the Red Team has again chosen Vortex and will integrate it in both the preplanning software and the onboard navigation tools. Vortex has been chosen for the fidelity and speed with which it can calculate vehicle dynamics, tire-terrain collision and force reactions.

“Vortex proved to be a central component of our pre-race planning software in 2004,” comments William L. “Red” Whittaker, leader of Red Team Racing. “The fidelity of the vehicle dynamics and tire-terrain collision, combined with fast performance rates were significant factors in helping us prepare for race day. For the Grand Challenge 2005, we have expanded how Vortex will be used and will incorporate it in both the preplanning and onboard navigation.”

Prior to the race, the course will be mapped and simulated in order to anticipate possible routes for the vehicle. Vortex will be used to accurately simulate the vehicle as it navigates the terrain, including both local area constraints and global path planning objectives.



During the race, Vortex will be embedded with the onboard navigational tools and used to simulate the track and rapidly determine the vehicle's trajectory. When racing, Highlander maneuvers autonomously. It corrects steering continuously and is free to choose alternate routes to avoid obstacles. The onboard system will extract terrain data from cameras, laser scanners, radar, and position sensors to feed a Vortex-driven planning software that will plan, track and safeguard the vehicle as it moves autonomously across the course.

The Red Team will benefit from the following Vortex features:

- High-fidelity vehicle dynamics, and tire-terrain tracking;
- Accurate force reactions;
- Fast calculation rates;
- Reliable performance;
- Flexible architecture for quick integration into overall navigation system.

### **About CMLabs**

Headquartered in Montreal, CMLabs is a service provider specializing in physics-based behavior modeling for realtime simulation. CMLabs' combination of professional services and innovative software tools enable developers to create high-fidelity interactive applications involving vehicles, machines or robots. Our COTS product Vortex is the leading commercial-off-the-shelf (COTS) development platform for modeling physics-based vehicles, machines and robots. Vortex is used by applications developers to build physically accurate motion models and interactive behaviors for demanding industrial applications such as training, virtual reality, and robotics and general visualization.

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### **About Carnegie Mellon's Red Team**

Carnegie Mellon University's Red Team is directed by Fredkin Research Professor William L. "Red" Whittaker, collaborating with his students, colleagues and a host of corporate sponsors. According to Whittaker, "The Red Team is racing to catalyze technology, build new relationships, change the view of what's possible and create new robotic applications in the world."

For more information about the Red Team, contact Scott Gray: [frescot@hotmail.com](mailto:frescot@hotmail.com) or Anne Watzman [aw16@andrew.cmu.edu](mailto:aw16@andrew.cmu.edu).