Vortex Drives EADS Robot Simulator for the Belgian Army

The Company

EADS is a global leader in aerospace, defence and related services. The Group includes Airbus, Airbus Military Eurocopter, and EADS Astrium.

The Situation

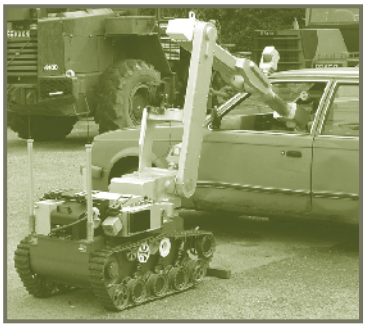
Explosive ordnance device (EOD) robots perform essential but very difficult work. The threat of an imminent explosion means they must be deployed quickly and accurately. But they are very expensive to build and a challenge to operate in these conditions, posing many training issues.

The Solution

To address these issues, the Belgian Army decided to develop an immersive, man-in-the-loop 3D simulator to bolster their training regimen. They picked EADS to create an EOD robot simulator, and EADS selected Vortex to provide the high-fidelity, off-the-shelf physics capabilities, fast performance and required realism.

The Results

Belgian Army operators now train on a completely realistic EOD robot that they manipulate in many different environments. They gain essential mission-rehearsal skills and operational experience with no risk to expensive equipment. With Vortex, EADS accelerated development, exceeded requirements, and delivered a superb training solution.



The Belgian Army uses explosive ordnance device (EOD) robots to perform important security tasks such as finding, disarming and removing explosive devices. The robots are tele-operated and feature multi-jointed arms with hand-like manipulators. Since they perform a crucial service they are almost always in use or on call, limiting their availability for training. As well, because they are expensive, operator mistakes can be costly.

To increase training opportunities and safety, and lower operational risks, the Belgian Army decided to implement a fully featured high-fidelity EOD robot simulator. To develop their simulator, they contracted with the **European Aeronautic Defence and Space Company** (**EADS**) – one of the largest aerospace companies in the world – because the EADS military aircraft division has extensive experience designing and deploying world-class simulators of flight-control systems.

Vortex Saves R&D Costs while Delivering an Advanced Feature Set

Early in the project, EADS realized that building their own robot simulation solution would have required extensive research and development. As well, it was clear that EADS needed physics software that would accurately simulate the movement and interactive behaviour of the robot. The solution also needed to be fast since the simulator would be user-controlled. After initial research, EADS selected **Vortex**, a commercial-off-the-shelf (COTS) SDK. Vortex not only impressed EADS, it exceeded their requirement specifications.

EADS chose Vortex because it delivers the expertise, physics toolkit and capabilities that have put Vortex-powered realism, motion and accurate behaviour at the forefront of the simulation industry. Vortex provides advanced modeling capabilities for physics-based vehicles, machines and robots, and includes libraries for real-time dynamics, collision detection and force reaction. Vortex was ideally suited for developing EADS' interactive EOD robot training simulator.

vortex

"The product itself and the support from the Vortex team have been outstanding. The team is quick to respond and provides very helpful technical analysis to our questions."

Oliver Albrecht, Lead Engineer, **EADS**

Vortex Delivers Superior Robot Realism Like Climbing and Grasping

With Vortex, EADS recreated the entire range of robot movement, including precise balancing while climbing up or down stairs, accurately positioning the arms joint-by-joint, varying grip-arm sensitivity, and carefully grasping explosives to move them to a safe location.

Oliver Albrecht, Lead Engineer on the project, was extremely impressed, "The best feature of the simulator is the realism. The simulated robot behaves as you expect it to, and the operator can position the arms and manipulators just like an actual one."

Another major benefit of working with Vortex is that it allowed EADS to quickly model the robot to move and interact with realistic 3D environments, such as airports, train stations, office buildings and city streets. Vortex's easy integration into their existing simulation framework saved time and allowed EADS to focus on other aspects of the simulator design.

From project beginning to end, Vortex provided EADS with substantial benefits, such as robust physics capabilities, fast performance rates for man-in-the loop simulations, a unique combination of dynamics, collision detection and force reaction, and an object-oriented API for easy integration with their in-house graphics and rendering solutions. And EADS especially appreciated the Vortex team's exceptional and timely support services – ensuring success at all phases of the project.

Simulators are crucial for preventing expensive operator errors. Before implementing the simulator, EOD robot-training accidents cost the Belgian Army over 1-million euros.

Operators can practise tricky operations like opening car doors and trunks, climbing stairs, and avoiding clumsy movements that might trigger an explosive device.

About Vortex

Vortex expertise and technology put high-fidelity behaviour in motion in applications for training simulators, mission rehearsal, serious games, virtual prototyping and testing. Vortex customers include Honda, John Deere, L-3, Lockheed Martin, NASA, Carnegie Mellon University, and over 100 other leading companies and academic institutions.

behaviour in motion

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