TECHNOLOGY

Smart Gun Barrels With Embedded Fiber Optic Sensors

OVERVIEW

It is a huge tactical advantage in warfare to have weapons systems with an effective firing range longer than the firing range of an enemy. However, improving firing accuracy at a longer range is a constant challenge in modern weapon development. For battle tanks, warships and artillery, the gun barrel is a crucial part of the weapons system that affects firing accuracy. A small defect in the gun barrel may have a large negative impact on not only the effectiveness of the entire weapons system but also on operational efficiency and safety.

Researchers at the University of Maryland and Techno-Sciences, Inc., have developed a smart gun barrel system with self-diagnostics capabilities for continuous and automatic monitoring of barrel shape, temperature and round exiting velocity, which indicate the functional performance and structural health of the gun barrel in real-time. The system is comprised of fiber optic based miniature sensors which provide real-time monitoring of muzzle velocity and barrel health at low weight and cost. Additionally, the sensors are directly integrated into the gun barrel, immune to electromagnetic noise, and resistant to heat and wear. Current technology involves the use of radar and induction ring based detection systems, which are widely used in firing ranges. However, these systems are not suitable for real-time, on-barrel detection required for fuse setting.

The benefits of the system include improvement in gun firing accuracy, workload reduction for combatants and enhancement of operational efficiency and safety due to savings in maintenance and logistical support. The system may also be combined with smart actuator technology to develop a vibration control-stabilization system for long barrel weapons. The system is ideally suited for experimental applications involving barrel tube, projectile and propellant design, especially when projectile-barrel dynamic interactions are important and has broad applications in monitoring the health of a wide range of structures, including airplanes, bridges and dams.

For further information, please contact the Office of Technology Commercialization, (301) 405-3947, E-mail: otc@umd.edu.

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CATEGORIES

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EXTERNAL RESOURCES

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