Laser-based missile defense for helicopters being developed

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(PhysOrg.com) -- Protecting helicopters in combat from heat-seeking missiles is the goal of new laser technology created at the University of Michigan and Omni Sciences, Inc., which is a U-M spin-off company.

"Battlefield terrain in places like Afghanistan and Iraq can be so rough that our troops have often had to rely on helicopters, and they can be easy targets for enemies with shoulder-launched missiles," said Mohammed Islam, a professor in the Department of Electrical Engineering and Computer Science.

"Our lasers give off a signal that's like throwing sand in the eyes of the missile."

Using inexpensive, off-the-shelf telecommunications fiber optics, Islam is developing sturdy and portable "mid-infrared supercontinuum lasers" that could blind heat-seeking weapons from a distance of 1.8 miles away.

The technology is being commercialized through Islam's company, Omni Sciences, which has recently received $1 million in grants from the Army and the Defense Advanced Research Projects Agency (DARPA) to build a second-generation prototype. The Army grant is for $730,000 and the DARPA funding is $300,000.

The lasers are promising for helicopter protection because their robust, simple design can withstand shaky helicopter flight and their mid-infrared supercontinuum mode can effectively jam missile sensors.

Most lasers emit light of just wavelength, or color. But supercontinuum lasers give off a focused beam packed with light from a much broader range of wavelengths. Visible-wavelength supercontinuum lasers, for example, discharge tight columns that appear white because they contain light from across the visible spectrum.

Islam's mid-infrared supercontinuum laser does the equivalent, but it is the first to operate in longer infrared wavelengths that humans can't see, but can feel as heat. Heat-seeking missiles are designed to home in on the infrared radiation that the helicopter engine emits.

Because this new laser emits such a broad spectrum of infrared light, it can effectively mimic the engine's electromagnetic signature and confuse any incoming weapons, Islam said.

This new light source has many military applications, Islam says, but it is especially well suited for helicopters.

"The laser-based infrared countermeasures in use now for some aircraft have 84 pieces of moving optics. They couldn't withstand the shake, rattle and roll of helicopters," Islam said. "We've used good, old-fashioned stuff from your telephone network to build a laser that has no moving parts."

Omni Sciences, Inc. has licensed Islam's technology from the University of Michigan. Islam has a financial interest in this company. Wright-Patterson Air Force Base and the Naval Air Command have also funded this research.

Provided by University of Michigan