Carthage College: Students win prestigious Lemelson-MIT student prize honoring top collegiate inventors

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KENOSHA, Wis. – Five Carthage College undergraduates won the prestigious $10,000 Lemelson-MIT Student Prize for their work on Modal Propellant Gauging (MPG), a real-time technology that measures fuel in space.

The Lemelson-MIT Student Prize is a nationwide search for the most inventive college students. This year, physics majors Celestine Ananda ’20, Nicholas Bartel ’20, Bennett Bartel ’21, Taylor Peterson ’21, and Cassandra Bossong ’21 won the “Move It” undergraduate category that recognizes technology-based inventions that involve transportation or mobility.

“Winning this award is really something special, especially being from a small liberal arts school from Kenosha, Wisconsin,” said Bossong. “We competed nationally with schools like Harvard, MIT, Yale, and so on, but we beat the odds and I am excited to see what the future holds for both the Modal Propellant Gauging (MPG) technology and the team.”

Carthage’s MPG invention provides accurate, real-time fuel gauging for aircraft, spacecraft, tankers, and other vessels carrying sloshing liquid fuel, expanding on the original method used for spacecraft developed by their faculty advisor Kevin Crosby and colleagues at NASA. MPG uses the well-established technique of modal analysis, which uses acoustic vibration and sensors as a form of measurement.

“This team took a technology that we had envisioned for spacecraft and showed

that it can help solve a long-standing problem in general aviation. Fuel gauging errors plague small aircraft and are responsible for dozens of crashes each year," Crosby said. "The team developed a version of MPG that can work in aircraft, which really exemplifies the spirit of innovation – the ability to see around corners and beyond the horizon. I'm so inspired by their hard work and creative approach to problem-solving."

On track to be included in NASA's Artemis program, which promises to put the first woman and the next man on the moon within the next 10 years, MPG has been tested on manned parabolic flights and flown on Blue Origin's New Shepard vehicle, an unmanned suborbital rocket that allows for approximately 3 minutes in zero gravity.

The team is in the process of negotiating patent licensing, and has plans to modify the MPG to make the technology more robust, require less power, have lower equipment costs and be easier for factories to recreate for commercial use.

The "Move It" Student Prize is one of eight awarded by the Lemelson-MIT program this year. Each winning team of undergraduates received $10,000, and each graduate student winner received $15,000.