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Piaggio Fast Forward and Trimble Announce Proof-of-Concept Collaboration to Utilize Proprietary Smart Following Technology

BOSTON and SUNNYVALE, Calif., March 18, 2021 /PRNewswire/ -- Piaggio Fast Forward (PFF), a leader in smart following technology and subsidiary of the Piaggio Group (PIA.MI), and Trimble (NASDAQ: TRMB) announced today a proof-of-concept collaboration to enable robots and machines to follow humans and other machines in industrial applications.

Together, the companies have integrated a patent-pending PFFtag ™ smart following module prototype developed by Piaggio Fast Forward onto a Boston Dynamics' Spot® robot platform controlled by Trimble's advanced positioning technology. This eliminates the need to solely control the robot via joystick. This proof-of-concept is one of the many robots and autonomous vehicles Trimble provides solutions for and could apply to many industries Trimble serves, including construction, mining, agriculture and logistics.

Through PFF's extensive research and observations of how people navigate the physical world, the company continues to create innovative mobile technology solutions dedicated to improving human efficiency through intuitive collaboration with machines. The Trimble proof-of concept is a natural iteration of PFF's technology and business activities.

"Most robotics companies look at the world as a world of obstacles," said Greg Lynn, PFF's chief executive officer. "At PFF, we adopted the opposite approach and this philosophy has fueled our research of how humans and robots physically move through space. We design behaviors that understand people and help automate tasks so you don't have to build complicated hardware. Working with Trimble to boost the process of replacing remote-controlled robots traveling on predetermined paths in mapped environments enable yet another step in the ultimate goal of providing safe and intuitive operations of machines in industrial environments. Dynamic following technology is one step closer to kicking the doors open to further implementation—from power tools to farming equipment to even automated vehicles."

While many robots, including Spot, are currently controlled by joysticks operated in person or by telepresence from a remote location, operators can now leverage PFF's exclusive smart following technology, that allows humans to lead other robots and machines, providing a larger range of navigation methods—remote control, autonomous, and now, following—in dynamic environments. PFF engineers have been able to componentize the smart following technology developed for PFF's gita ® robot into a stand-alone module called PFFtag, which can be integrated on other machines or robots.

PFFtag enables external partners to leverage its exclusive algorithms and allow their software to communicate with PFF's software. This enables a human to control the robot via pairing and improves the robot's ability to sense direction and velocity as it follows the leader. A simple push of a button activates a fused sensor array that pairs to a leader who navigates Spot or another robot or machine in dynamic environments such as construction and civil engineering spaces—there is no special training to operate or joystick, no app or tablet. Ultimately, this can create a wider range of applications for existing machines and positively impact productivity, safety and quality of work.

"Through its collaboration with Trimble, Piaggio Fast Forward once again demonstrates its pioneering vocation and ceaseless research into new forms of interaction between human beings and robots, where people and their mobility needs are the foundation for our mission," said Michele Colaninno, founder and chairman of Piaggio Fast Forward. "Robots are a growing presence in our lives, both private and professional, helping to make human activities less burdensome and more efficient. When technology and robotics are put at people's service, I believe they can play a significant role in transforming individual mobility and re-defining workplaces and urban environments to make them more sustainable and people-friendly, and so help create a better future."

As part of the proof-of-concept, Trimble conducted testing using a Spot robot equipped with Trimble laser scanning or Global Navigation Satellite System (GNSS) sensors and PFFtag technology at one of its customer's sites in Colorado over the course of two months.

"The follow-me technology by PFF provides an intuitive user experience and opens the door to collaborative robots that can augment the human workforce," said Aviad Almagor, division vice president, Trimble's Emerging Technologies. "Like, a 21st century Sancho Panza, robots with PFFtag, may have the future ability to assist construction professionals in their daily workflow, carry heavy equipment, improve efficiency and enhance workers safety."

Armed with value insight from this proof-of concept, PFF will continue its vision of helping humans and machines collaborate in all environments, leading the charge to support the smart cities and worksites of tomorrow.

To view a 2 minute video showcasing PFFtag on-site, visit: Piaggio Fast Forward Youtube.

About Piaggio Fast Forward

Smart following technology leader Piaggio Fast Forward (PFF) is aBoston-based company founded in 2015 by the Piaggio

Group, the Italian manufacturer and creator of the iconic Vespa scooter. PFF has an extensive knowledge of pedestrian mobility and uses this knowledge to create innovative mobile tech solutions that move the way people move—to help people walk more, walk farther, and to allow them to do more of their everyday living on foot. PFF's first product, the gita robot (pronounced "jee-ta," Italian for "short trip"), is a first-of-its-kind following robot that can carry 40 pounds of gear for up to 4 hours, or roughly 20 miles of walking, on a single charge. gita efficiently navigates pedestrian-dense environments using computer sensor vision; it takes in information and adapts to its environment in real time with human-like pedestrian etiquette. gita pairs to, follows, and reacts to its user without the need of GPS, allowing it to travel both indoors and outdoors seamlessly. PFF's vision is to move toward a sustainable mobility ecology where cities are centered around people over cars, and value transportation systems that support healthier lifestyles, cleaner environments and stronger local economies. For more information, visit: www.piaggiofastforward.com .

About Piaggio Group

Established in 1884, Piaggio Group is the largest scooter and motorcycle manufacturer in Europe and one of the global leaders in the sector. The Piaggio Group has been listed on the Italian stock exchange since 2006 and has three main business lines: 2 and 3 wheelers (scooters and motorcycles), light commercial vehicles and robotics (PFF). The Group's portfolio includes some of the most iconic and famous brands in the light mobility industry, such as: Piaggio, Vespa, Moto Guzzi, Gilera, Derbi, Ape and Piaggio Commercial. Piaggio Group counts more than 6,600 employees; it has distribution in more than 100 countries and six industrial plants (in Italy, India, China and Vietnam). The Group also has four research and development centers, which employ approximately 1,000 people.

About Trimble

Trimble is transforming the way the world works by delivering products and services that connect the physical and digital worlds. Core technologies in positioning, modeling, connectivity and data analytics enable customers to improve productivity, quality, safety and sustainability. From purpose built products to enterprise lifecycle solutions, Trimble software, hardware and services are transforming industries such as agriculture, construction, geospatial and transportation. For more information about Trimble (NASDAQ:TRMB), visit: www.trimble.com .

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Additional assets available online: Video (1)

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