Survivability for Aircraft Arming and Refuel Points

Tipping Point Military Innovation responds to Response to the Army Applications Laboratory's Request for Information

Tipping Point Military Innovation's 3D virtual sand table

ORLANDO, FL, US, December 1, 2023 /EINPresswire.com/ -- TPMI has over 10 Patented Technologies dealing with Information. In Novdember 2023 the Army released ADP 3-13, Information. This is the first Army's first publication dedicated to information. The Forward states "Information is central to everything we do—it is the basis of intelligence, a fundamental element of command and control, and the foundation for communicating thoughts, opinions, and ideas. As a dynamic of combat power Army forces fight for, defend, and fight with information to create and exploit information advantages—the use, protection, and exploitation of information to achieve objectives more effectively than enemies and adversaries do.".

Tipping Point Military Innovation (TPMI) was very pleased to respond to the Army Applications Laboratory (AAL) request for information (RFI). This response was centered around TPMI's virtual sand table and how it can be the foundation for communicating thoughts, opinions, and ideas and importantly providing a common understanding of the situation and solutions thereto. In this response, TPMI's technology can improve the Army's Forward Arming and Refueling Points (FARP) by making them harder to detect, more efficient and less vulnerable to attack.

This article will summarize some of the key questions that the AAL has asked along with TPMI's response.

Question #1. "How would you increase the survivability of the Forward Support Company in the establishment of a FARP?"

The US Army is scheduled to receive 100,000 Integrated Visual Augmentation Systems (IVASs). The product that TPMI will build to increase survivability will be an advanced 3D visualization suite for Soldiers called the 3D virtual sand table, which will be viewed on the IVAS.

TPMI's advanced military sand table technology would enhance the Army's ability to optimize selection of a FARP. Selection of the optimum FARP is absolutely critical to increasing survivability of the Forward Support Company.

First, TPMI's 3D virtual sand table would enable each element within a Forward Support Company the ability to train and rehearse using virtual imagery corresponding to the actual FARP location. TPMI's 3D virtual sand table includes tangible tools, which enable markup of virtual terrain. (US Patents 11,207,133 and 11,417,071)

A pre-planning session on TPMI's 3D virtual sand table could be performed. TPMI's 3D virtual sand table can help increase efficiency of set up. For example, selecting a FARP location where there is smooth terrain can reduce setup time. Pre-planning on TPMI's 3D virtual sand table can help avoid rough terrain and bad roads. Additionally, each equipment item in the FARP could be assigned a particular GPS coordinate and orientation. Items are sequenced into first item positioned and oriented, second item positioned and oriented, etc. This would enable each member to have a clear mental image of the FARP location and where everything goes. The Forward Support Company his would have significantly increased efficiency.

Second, TPMI's 3D virtual sand table would enable selection of a particular location wherein Army personnel can be more concealed. TPMI's virtual military sand table allows visual analysis of virtual military craft from different locations and from different perspectives including aerial views and land views. (US Patent 11,574,435) The FARP location can be selected using TPMI's 3D virtual sand table to optimize concealment.

Third, TPMI's 3D virtual sand table would enable maximal utilization of 3D LIDAR data so as to optimally select a FARP location, which is less vulnerable to attack. A 5 October Army Times article quoted BG Schneider, PEO Soldier who said “IVAS is not just what you’re wearing,” Schneider said. “A lot of the tools reside on IVAS already. A soldier can fly a soldier-borne sensor right now, take imagery of a target, send that to the tactical cloud package, which turns it into a 3D rendering.” TPMI's 3D virtual sand table will incorporate real time data and whatever enemies/threats are actually present in the battlefield. Such data can be utilized to reduce US Army vulnerability.

In sum, TPMI's 3D virtual sand table will allow selection of the optimum FARP, which will improve efficiency, improved concealment and improved vulnerability.

Question #2. How would you increase the survivability of the FARP during operations?

A key threat is a surprise attack during operations. If a threat is encountered, how do Soldiers

have an immediate, coordinated engagement with the enemy? TPMI's aims to improve the IVAS to improve situational awareness and achieve rapid and coordinated targeting to counter such a surprise, which will improve survivability of the FARP during operations.

First, from the Soldier's perspective, he/she needs to maintain situational awareness. This requires maintaining a comprehensive search pattern. TPMI's technology enhances the IVAS by placing digital objects at locations within the scene to assure a comprehensive search pattern. (US Patent 11,442,538) A force that is more situationally aware will have increased survivability.

Second, from the leader's perspective, it is important to know where your Soldiers are looking. One can infer the general direction of where a Soldier is looking by analyzing the Soldier's body position and head position. However, it is difficult to infer the exact spot where the Soldier is looking and even more difficult to track where multiple different soldiers are looking. TPMI will integrate its patented multi-user eye tracking system so each Soldier can see where other Soldiers in the squad are looking. (US Patent 11,380,655) In the event of a surprise attack, the Soldiers will be better prepared to deliver a coordinated response.

Third, in the event of a surprise attack, a Soldier needs to rapidly engage the target. TPMI's technology enables display of a digital object at the location of the target and utilize a corresponding movable high resolution field of view. TPMI's visual alert system will provide rapid identification and technology to improve characterization. (US Patent 11,093,051) Thus, in the event of a surprise attack, the Soldiers will be able to more rapidly engage the target.

Question #3. How would you increase the survivability of the Forward Support Company in the breakdown and movement of a FARP?

TPMI's 3D virtual sand table coupled with the TPMI-enhanced IVAS system offers the ideal solution for increasing survivability of the Forward Support Company during the breakdown and movement of a FARP. This is achieved through improving the efficiency of operations.

TPMI's technology would efficiently alert soldiers of key items during both the setup and the breakdown and movement of a FARP via the following sequence:
1. A pre-planning session is performed on TPMI's 3D virtual sand table, as explained in question #1. Each equipment item in the FARP is assigned a particular GPS coordinate and orientation. Items are sequenced into first item positioned and oriented, second item positioned and oriented, etc.
2. Each equipment item has a GPS transceiver.
3. Soldiers are assigned tasks visually on a TPMI-upgraded IVAS based on the pre-planning session. For example, a virtual object mimicking the tangible Army equipment are placed at the assigned GPS coordinate with the assigned orientation during the pre-planning session. Instant knowledge of GPS coordinate of the equipment will increase efficiency of Soldier operations. (US Patent 11,709,546)

TPMI's technology will enable precise positioning of equipment at any selected FARP. Each piece of equipment can be perfectly planned and spaced out. Obstacles in field (e.g., big rock) can be accounted for and thought through during the planning phase, well before Soldiers arrive at the selected FARP. The equipment will not only be set up quicker, but the operations at the FARP will run smoother because of well positioned equipment.

Question #4. How do we decrease the amount of time the Aircraft is required to remain on the ground during Refueling operations?

TPMI will decrease the amount of time the Aircraft is required to remain on the ground during Refueling operations through integrating its advanced visualization suite into the IVAS. This integration would increase efficiency and safety of operations on the ground during operations at a FARP by improving a Soldier's ability to work with equipment.

There is a wide range of military equipment involved in Refueling operations. The questions “where does this part go?” and “how am I supposed to hold this thing?” often enter the mind of the Soldier. TPMI has developed a 3D virtual hand to be displayed on the IVAS wherein the 3D virtual hand is spatially registered to an object in the scene at pre-determined locations. (11,285,674)

The 3D virtual hand is also programmed to perform specialized hand and finger movements along the object with proper alignment with the object no matter what the object’s orientation is. If the IVAS is upgraded with TPMI's technology, the Soldier can place his hand over the virtual hand and superimpose his fingers over the virtual fingers to achieve correct hand and finger positioning onto the tangible object. This technological breakthrough provides an important way to speed ground operations during Refueling operations.

Thus, TPMI's technology can work together for Soldier working with complex military equipment. Questions like "how am I supposed to hold this thing?" can be readily answered if TPMI's technology is integrated into the IVAS. By improving Soldier efficiency, the aircraft can be on the ground for less total time during refueling operations.

Question #5. How do we decrease the amount of time the Aircraft is required to remain on the ground during Rearming operations?

TPMI will decrease the amount of time the Aircraft is required to remain on the ground during Rearming operations through integrating its advanced visualization suite into the IVAS. This integration would increase efficiency and safety of operations on the ground during operations at a FARP by improving a Soldier's ability to work with equipment.

Consider the questions: How does this part connect to that part? How is Part #1 positioned with respect to Part #2? How is Part #1 aligned with Part #2? What are their orientations? Using TPMI's patented technology (US Patent 11,090,873), the Soldier can hold Part #1 in his hand and

see through an upgraded IVAS a virtual object corresponding to Part #2 registered to the tangible Part #1. No matter what the orientation is of tangible Part #1, the virtual object corresponding to Part #2 will be correctly aligned. This allows instant understanding of position and orientation alignment.

TPMI's technology can help a Soldier build complex military equipment more efficiently. Questions like "how am I supposed to hold this thing?" and "how does this part connect to that part?" can be readily answered if TPMI's technology is integrated into the IVAS. By improving Soldier efficiency, the aircraft can be on the ground for less total time during rearming operations.

Question #6. How would you support over time the increasing physical load requirements on Soldiers?

As previously discussed, TPMI's 3D virtual sand table will help optimally select a FARP location and optimally arrange military equipment at the selected FARP location. Soldiers wearing the TPMI-upgraded IVAS would see the pre-planned position and orientation of each piece of equipment.

TPMI's effort to reduce physical load requirements would be through understanding the impact of the pre-planning session (selection of FARP and arrangement of military equipment at FARP) on Soldiers physical metrics (e.g., heart rate, number of steps, fatigue scale) during operations.

Consider two different arrangements of military equipment in the pre-planning session. Arrangement #A could yield a higher overall physical load requirement where Soldiers are exhausted with high step counts. Arrangement #B could yield a lower overall physical load requirements where Soldiers are mildly fatigued with low step counts. In essence, feedback data from Soldiers can be utilized to fine tune the pre-planning session on TPMI's 3D virtual sand table.

Question #7. Is there a way to conceal the location or presence of a FARP in the battlespace?

As previously discussed, TPMI's 3D virtual sand table will help optimally select a FARP location and optimally arrange military equipment at the selected FARP location. Soldiers wearing the TPMI-upgraded IVAS would see the pre-planned position and orientation of each piece of equipment.

TPMI's effort to conceal the location or presence of a FARP in the battlespace would be through understanding the impact of the selected FARP location and arrangement of military equipment on conspicuity.

Consider two different arrangements of virtual military equipment in the pre-planning session. These arrangements of virtual military equipment on virtual terrain can be view on TPMI's 3D

virtual sand table by Soldiers wearing IVAS units. TPMI's 3D virtual sand table has 3D fly through capability. Arrangement #A could yield greater conspicuity. Arrangement #B could yield a less conspicuous arrangement. A visual understanding of factors that determine conspicuity can be better understood through TPMI's 3D virtual sand table. The arrangements can be fine tuned so as to be more concealed.

TPMI's 3D virtual sand table enables the Soldier to visually analyze conspicuity, which will help the Soldier optimally select a FARP location and optimally arrange military equipment at the selected FARP location.

Question #8. How would you decrease the amount of time it takes to set up and disaggregate a FARP?

In order to decrease the amount of time it takes to set up and disaggregate a FARP, the team must be able to operate together efficiently and effectively. To do this, Soldiers need to be able to communicate effectively. TPMI's technology platform will enhance communication between Soldiers.

A challenge Soldiers face at a FARP is loud noise exposure from military equipment. Sound localization is important in for operations at a FARP. A Soldier faces a number of challenges in sound localization. The Soldier's helmet can hinder auditory localization. The Soldier's hearing can be affected from loud explosions hindering the intrinsic hearing capability. The sound could also be short lived, not providing enough time to perform localization.

Consider the scenario. Soldier #A is trying to get the attention of Soldier #B, but Soldier #B is not looking the right way and Soldier #B cannot hear Soldier #A very well.

TPMI's Patent 10,846,911 provides technology for localizing a sound to a position coordinate and displaying a virtual object on an augmented reality display to indicate where the sound originated. TPMI's technology method to visually localize the origin of a sound, which is key for rapid communication at loud environments. (US Patent 10,846,911) If the IVAS is upgraded with TPMI's technology, the Soldier can view a virtual object to indicate the location of sounds as they occur in real time or view locations of sounds at past time points.

Now consider the scenario with the TPMI-upgraded IVAS. Soldier #B will see a virtual object displayed on an upgraded IVAS at the location of Soldier #A for rapid sound localization. In the event that Soldier #A is not within the field of view of Soldier #B, an arrow indicator will be displayed to Soldier #B to indicate the direction of the sound. This will enable multiple Soldiers at different locations to 'see where the sound came from'. Teamwork is enhanced. Efficiency is improved.

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