Smart Helmet

The urban combat scenario is always challenging given the constrained space of operation and the unknowns of the area of operation. Hence any form of real time situational awareness increases the chances of success. To address this need for real time situational awareness especially for urban low intensity operations the “Smart Helmet” can capture the 3D information of any unknown environment in real time and assist in tracking combat agents in No-GPS scenarios leading to better planning and decision making.

The “Smart Helmet” comprises of a sensor suite mounted on the helmet of an active combat soldier which in turn are connected to a wearable “waist pack” compute to be worn around the waist. The sensor suite consists of a solid state LiDAR (Light Detection and Ranging) with an optical RGB camera and a IMU-enabled (Inertial Measurement Unit) stereo camera.

The Smart Helmet works in two modes :

1.) **The Mapping Mode** : In this mode, the combination of sensors help to capture the 3D information of any environment in real time and the software (running on the compute) generates a 3D map of the same environment. Along with 3D map a database of unique 2D RGB images is recorded and stored on the compute. Each 2D RGB image is uniquely mapped to a particular 3D location in the 3D map.

2.) **The Localization Mode** : In this mode, any combat agent wearing the Smart Helmet can determine its 3D position w.r.t the 3D map in real time. The optical sensor in the sensor suite captures the images in real time and is matched with the unique 2D image database using an AI algorithm. From this matching the 3D position of the combat agent w.r.t. the 3D map is determined. Hence by just using optical sensor like a RGB camera we are able to determine the 3D coordinates of a moving combat agent in real-time.

The 3D map can serve as a “Local Positioning System” for conflicted and remote areas where we might have “No GPS” or “Low GPS” scenario. With the help of the “Smart Helmet” working in Localization mode, members of a combat team or search and rescue team can precisely determine their own 3D positions in real time.

This positioning system has an accuracy of up to 50 cm and has no dependency on external positioning system or external RF source. Using a suitable wireless system the positional information of multiple combat agents wearing the “Smart Helmet” can be transmitted to a central hub. The live position information of multiple combat agents inside a hostile territory increases the situational awareness and will help a commander in effective planning and decision making