***Drone location/orientation awareness*:**

For this, we can use multiple methods.

We can use TDOA (TimeDifference Of Arrival), TOA (Time Of Arrival), RTOF (Round Trip Of Flight) as indoor location algorithms to be able to locate the drone inside the vehicle/station.

**Problems:**

Synchronization, multi-path propagation, noise, real-time use...

**Solution:**

Multi-lateration algorithm based on distance calculated from RTOF, TDOA or TOA algorithm.

There is aleady a solution that can use TDOA as a basic algorithm.

There will be 4 or more ”anchor” units stationed in the space each of the modules, from which we will calculate the distances and have the absolute position to these anchor points.

Each of the modules (rooms/compartments in space) will have at least 4 of anchor units and the tracking can be done in each of the modules of, for example, space-station, separately. These units can be docked to the walls of the module, via magnetic, mechanic, electrostatic of vacuum attaching points.

On the drone itself, in order to solve the problem of knowing the orientation, we would need to find position of 3 points at least.

On the astronauts themselves we can place also, multiple of these “tracking” points. This could help us to locate the astronauts (in case we need to bring object to them and/or help them in a different way). These tracking points, placed on astronauts, can also help us with the planning of routs.

As the base, we could use, as the basis, a project similar to Open RTLS.

Problem with this platform is that it has precision of 10 cm, so, in order to have orientation issue addressed the tracker mounting point have to be at distances at least 2 times greater than this maximum error.

***The advantages of OpenRTLS solution are:***

\* it is out-of-the-box(problem of synchronization between the anchors is done wirelessly, without need for modification on our side),

\* to quote producer (reference document [1]): “a decentralised data-handling architecture ensure limited-less scalability...”

\* already made, small, light tags.

In reference document [1] you can see a starter kit, which can probably be further customized for our purposes (without humidity/air pressure sensors).

***References:***

[1] <http://doc.openrtls.com/OpenRTLS_starterkit.pdf>