



Accuware Visual Positioning System

Accuware Visual Positioning System (VPS) Dragonfly enables mobile devices to determine their location in a venue, in real time, in 3 dimensions, by processing video signals captured by their cameras.

Features

- Device location is computed client-side by VPS software
- Location is provided as **latitude**, **longitude**, and **altitude** (off the floor)
- A venue may be indoors, outdoors or a mix of both
- Location is determined using **simultaneous localization and mapping (SLAM)**
- High location accuracy

Components

- Equipment such as autonomous mobile robots and drones equipped with video cameras
- Accuware's **Dragonfly** client-side software to compute the equipment location
- Accuware's online **Dashboard** to manage a site's data and generate Marker images
- **Markers** are graphical images that identify a specific 3-dimensional location. They are sparsely deployed through a venue, and are used for map calibration

How it works

- Device location is computed client-side by Accuware's **Dragonfly** software
- Dragonfly estimates locations using **simultaneous localization and mapping (SLAM)**, processing video from the equipment's camera
- A few **Markers** are placed around the venue to enable map calibration
- Marker images are generated via Accuware's **Dashboard**. Each image encodes a specific 3-D location
- Marker images are affixed (ex. printed, etched, painted, etc.) to flat objects (ex. paper, tile, tag, sticker, tape, etc.)
- Markers are physically placed indoors or outdoors throughout a venue during the **Site Setup** process





Sample applications

- **Indoor positioning:** an autonomous mobile robot or drone may compute its location in a venue, including distance off the floor
- **Warehouse management:** autonomous mobile robots can determine their location in a facility, including under lights-out conditions. Robots and lift trucks automatically record inventory locations as items are placed on racks. Drones navigate indoors to perform inspections and/or tasks that require visual identification
- **Security:** Autonomous mobile patrol robots may issue alerts and record video annotated by accurate locations
- **Retail:** Autonomous mobile robots inside large stores assist customers with accurate knowledge of their own location and that of items anywhere in the store

Getting started

A minimum of 3 Markers must be placed throughout the venue at specific locations whose coordinates are encoded in the Marker. The process is referred to as **Site Setup**:

1. One or more floor plans of the venue must be uploaded for each level via the Dashboard.
2. Locations for Marker placement are indicated on the floor plans.
3. Marker images are generated and placed at each pre-determined location.
4. If placed on vertical surfaces, images are set with their top edge level at a given height.
5. If placed on the floor or ceiling, the image's top edge must be aligned in a North-South direction using a compass
6. Positioning accuracy is verified by moving through the venue running a **VPS app**

Video cameras

- Device cameras must be of medium or high resolution
- Adequate lighting must be available in the venue
- Equipment must run the VPS software



Markers must be placed...

- According to the orientation specified during Site Setup
- At the pre-specified height
- When placed on vertical surfaces, top edge must be level