



Accuware Dragonfly



Dragonfly is a visual positioning system that provides automated equipment, such as autonomous mobile robots and drones, with precise location in 3 dimensions. Applying patented **simultaneous localization and mapping (SLAM)** technology, Dragonfly uses the equipment's camera to deliver highly accurate location.

Functionality

Dragonfly was designed to provide accurate 3D positioning of mobile devices equipped either with a single-camera (**monocular** devices) or a stereo camera. The camera is the only sensor required to compute location.

Dragonfly does **simultaneous localization and mapping (SLAM)**, performing visual odometry while simultaneously mapping the surrounding environment, locating the mobile device in that reconstructed environment. For clarity:





- **Mapping** means scanning and recognizing the venue to enable determining the device's position in it.
- **Locating** means computing the global 3D coordinates of the device's position within the 3D map reconstruction.

A 3D map also enables **relocation**, which means the possibility for a device to determine its location in a map that was previously computed.

Note that the 3D representation or map is not a human-readable image, but a collection of data that enables Dragonfly to describe an environment.



Features

-  A mobile device's location in a venue, computed by Dragonfly processing engine software.
-  Location is provided as latitude, longitude, and altitude (off the floor).
-  Dragonfly can be used in venues that may be fully indoors, outdoors or a mix of both.
-  Once properly calibrated, Dragonfly delivers average location accuracy better than 1 inch or 2.5 cm.

System Components



Mobile **equipment** such as autonomous mobile robots, drones or lift trucks equipped with a video camera.



Dragonfly **processing engine** computes the equipment location from the video captured by the camera.



An online **dashboard** enables managing a site's data and generating visual marker images.



Visual markers are graphical images that identify a specific 3-dimensional location. Three of them are deployed through the venue for map calibration.

Equipment

Mobile equipment such as autonomous robots, drones or lift trucks must be fitted with either a stereo or monocular camera.

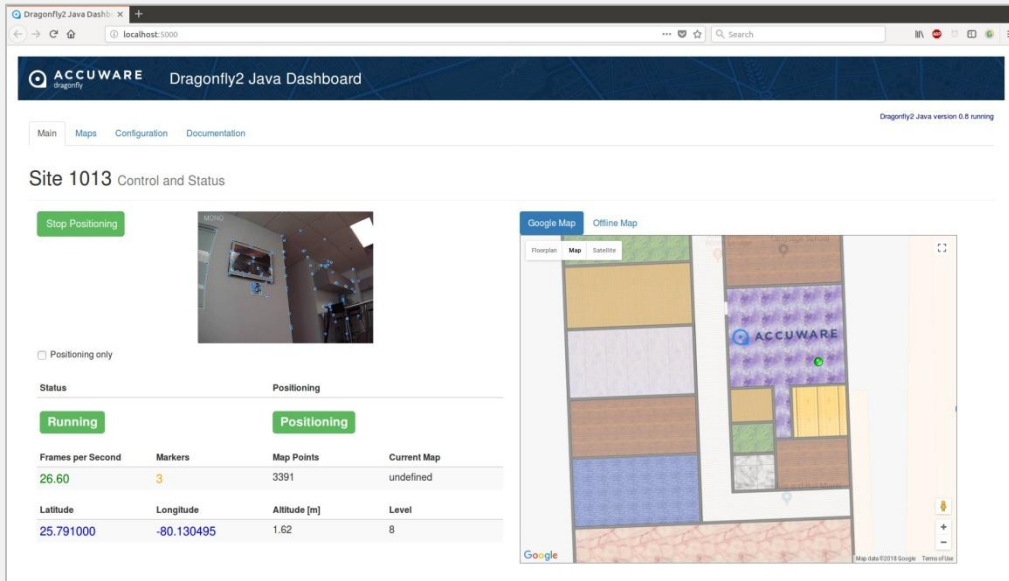
- Cameras' required resolution is 640x480 (VGA) at 60 FPS. Higher resolution leads to a slower system; lower resolution leads to lower accuracy.
- Adequate lighting must be available in the venue.





Dashboard

Provides the system's interface that enables remote monitoring as well as management of individual devices.



Visual Markers

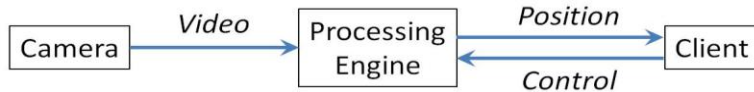
Dragonfly's internal 3D maps must be *calibrated* prior to using the system. The calibration process establishes the relationship between the map and global coordinates (latitude and longitude), as well as altitude off the floor. Calibration requires at least one **visual marker**. Using 3 visual markers provides better calibration.

- Markers are QR code-like patterns that encode their 3D coordinates in the real world: latitude, longitude and height. When viewing a marker, the camera's 3D position relative to the marker can be estimated from the marker's perspective projection. This technique enables Dragonfly to geolocate the 3D maps it builds in reference to global coordinates in the physical world. Markers are generated through Dragonfly's online dashboard, and are printed on regular printers.
- Correct marker placement is key to ensure the correctness of the coordinates computed by the system. Also, the camera should be within 5 meters of the marker and adequate lighting must be available.
- Markers can be removed once the calibration is complete.



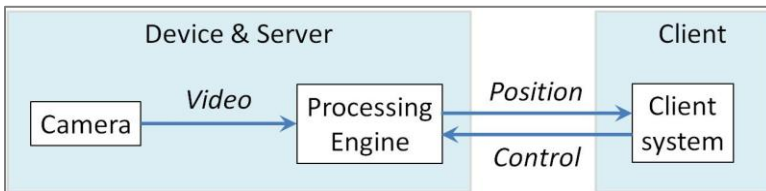
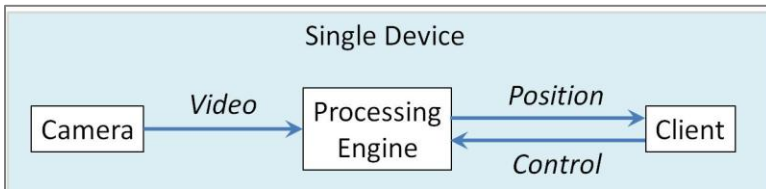
System Architecture

Dragonfly is provided in different configurations to accommodate a variety of needs.

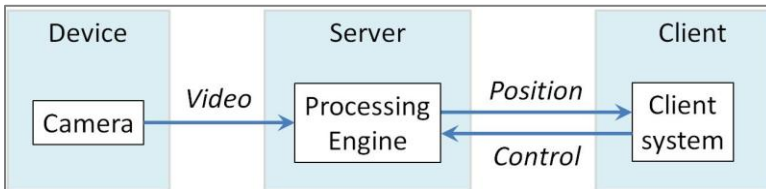


Basic architecture consists of a camera streaming digital video to a processing engine, which forwards the device's position to a client capable of issuing controls.

All 3 components may run on a mobile device.



Device and processing engine may run on the mobile device, communicating with a remote client.



Only the camera runs on the mobile device. It communicates with the processing engine running on a remote server, which in turn communicates with a remote client.

For more information

Contact our team: <https://www.accuware.com/contact/>

Visit our website: <https://www.dragonflycv.com/>