

## Paragliding Accuracy landing video evidence system

### Technical Specifications

#### Cameras

- Suitable enclosure for environment IP66 and sunshield
- Varifocal lens (Horizontal field of view 30 to 100 degrees)
- At least 60 frames per second
- Full HD or higher resolution on progressive scan (1080p)
- Wide dynamic range without frame-integration
- Power over Ethernet supply, so camera can be connected using only one cable

#### Recorder

- Suitable PC or server-platform based server
- Video management software preferably from same vendor as camera
- Capable of simultaneous recording, exporting and reviewing of playback
- Frame-by-frame incident review possibilities
- Bookmarking possibility of live events

#### Switches, networking

- At least 8 port Gigabit switches with PoE+ capabilities to feed all cameras
- Local WiFi connection only for adjusting cameras

#### Screen, viewing

- Dedicated workstation for reviewing incidents
- Very well shaded tent or spacious vehicle for normal office-type of work area
- At least 32" 700cd bright LCD screen for reviewing

### Positioning

- At least three cameras, as shown on Sketch1
  - 2 low cameras must not be positioned in obstructive way for pilots. Low positioning and at least 10m safe perimeter is tested and safe. 3<sup>rd</sup> camera (higher) location could be changed during the day, depending on the sun.
1. Camera
    - a. Positioned 0.5m above ground, at least 12m from landing pad
    - b. Narrow field of view only for 3m field of 5m landing area
    - c. Pointed towards west/north, depending on sun's position
  2. Camera
    - a. Positioned 0.5m above ground, at least 12m from landing pad
    - b. Narrow field of view only for 3m field of 5m landing area
    - c. Pointed 90 degrees to 1<sup>st</sup> camera, still considering sunlight
  3. Camera
    - a. Overview camera
    - b. 2-2.5m above ground, at least 15m form landing pad
    - c. Very wide field of view, including airspace and possible landing corridor
    - d. Direction depends on wind, sunlight

4. Possible extra cameras
  - a. There could be usage of extra cameras for certain angles or regions of interest
  - b. Placed by considering safety means
5. Consolidation point
  - a. Consolidation point is connection point for cameras, switches and power supply
  - b. Located within 90m of cabling range of cameras
  - c. Safe, dry, no direct sunlight, SKB or Peli case is the best solution
  - d. Consolidation point could have input modules for third party devices as:
    - i. Data stream from weather station
    - ii. Data from landing pad

### Video judge

- Located in suitable tent, vehicle or container near the landing spot
- Visual overview of landing area
- Accessible only for chief judge and event director
- Accessible for pilots only in case of official and written complaints with the presence of chief judge or other regarding official
- Has general knowledge of paragliding; has passed accuracy landing judging training. *(According to additional Estonian national requirements for PG accuracy judges, only target judges may be people who are not paragliding pilots themselves, active or former. Video judge falls into the same category.)*
- If separate technical support is not present, video judge is also responsible for operation of the whole video evidence system

### Workflow

Video system will be installed and tested prior the start of competition. Testing procedure consists of recording footage from test pilot and reviewing the video with chief judge.

All target judges will have a briefing on the field, concerning the positioning of the cameras. They should plan their movements so that they are not obstructing the FOV of the cameras, whenever possible.

There is always private radio connection between chief judge and video judge, event director is accessible on the same channel.

During the competition landings, chief judge will ask for confirmation of every score hand-measured, via radio communication. Thanks to 60 fps video, the first contact point is easily verified. Also, from the overview camera other critical issues can be determined, i.e. harness contact or dangerous manoeuvres.

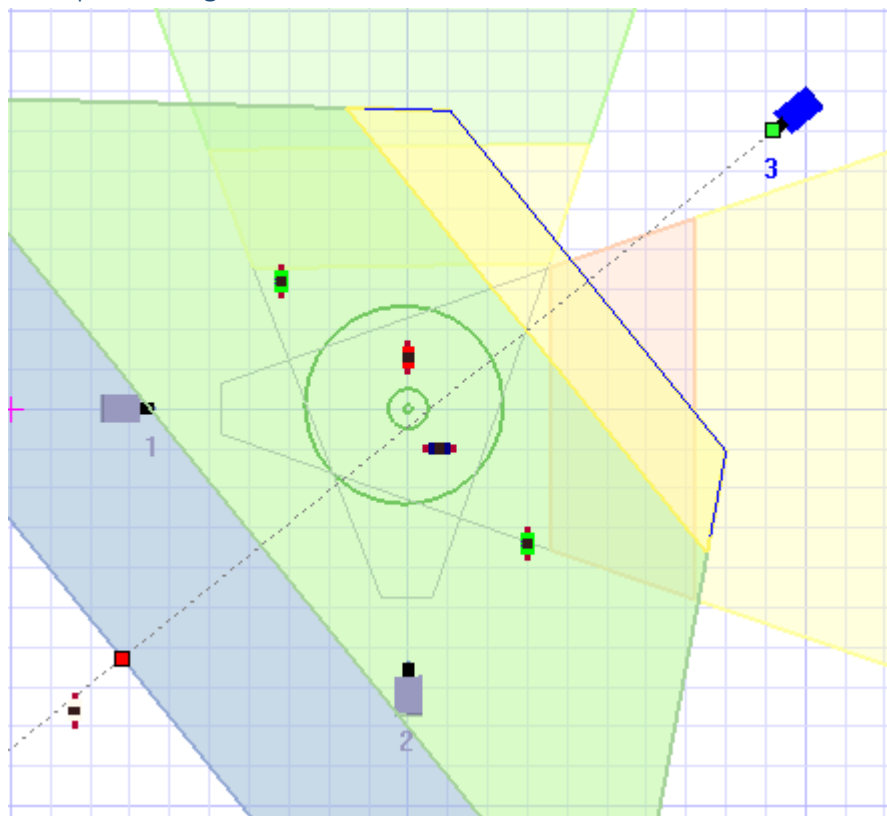
Only after having had the confirmation from video judge, the measured scores are announced.

Review of footage is immediately possible only for chief judge and event director. Pilots have access to videos only in case of official complaints and when the chief judge allows that and it is timely possible. After the time for protests is over, the video evidence may go public, according to the organisers.

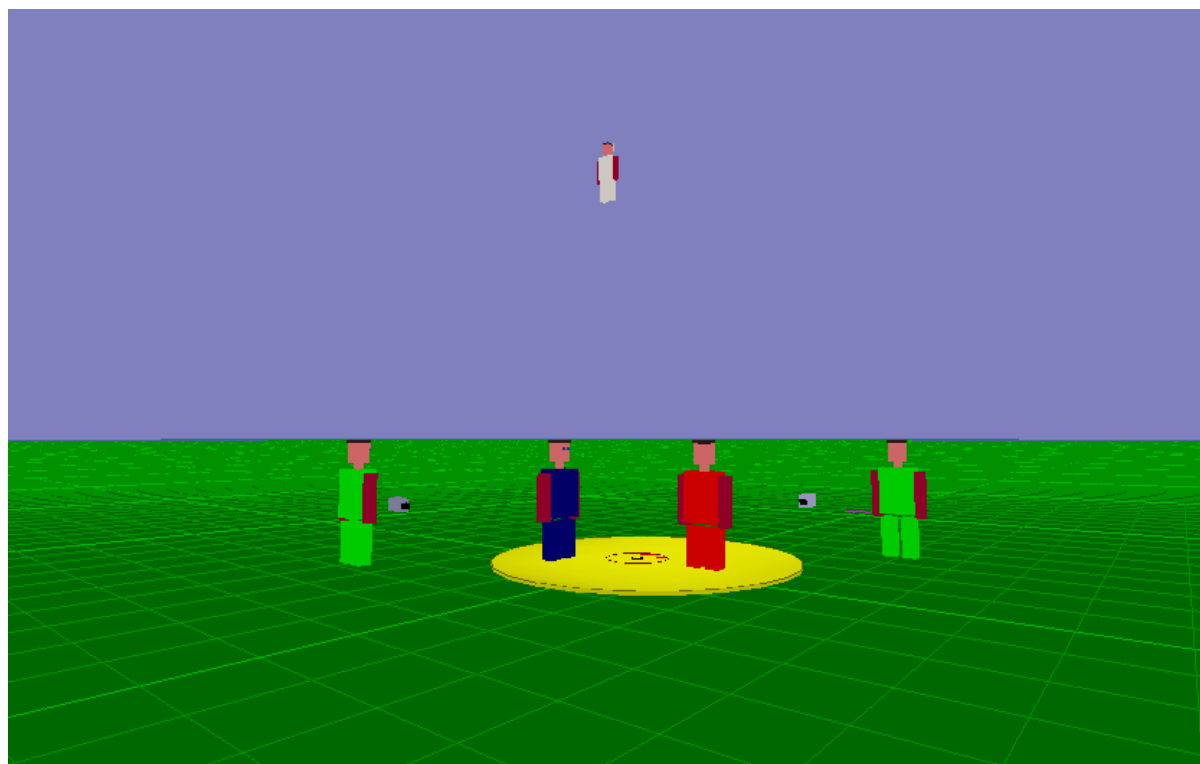
Video footage can be used for trainings, PR and promotional materials after the competition.

## Schematics

### Field positioning

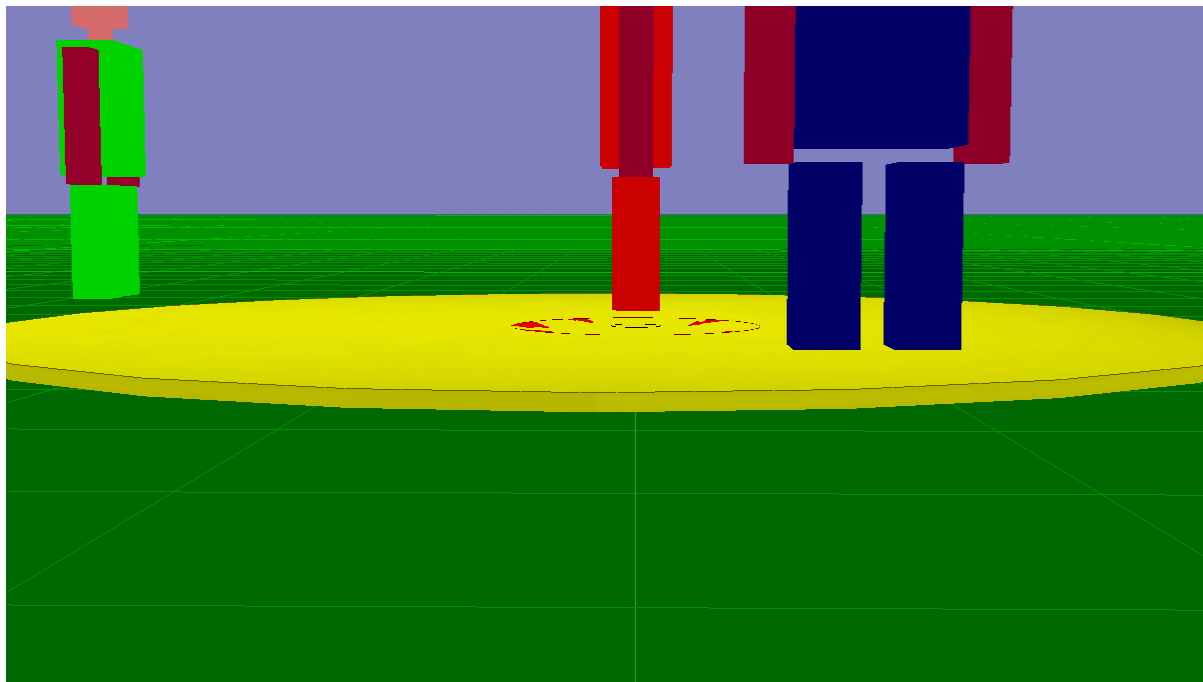


### Possible FOV for camera #3



Yellow is 5m measured landing area

Preferred FOV for camera #2



Preferred FOV for camera #1

