RedHell Tracking

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The tracking in the red hell is based on an image comparison algorithm. The live camera image is compared against a static background image. The background image is updated each time the status of a neon lamp in the red hell change. This paper describes the ongoing development process of this new tracking application.

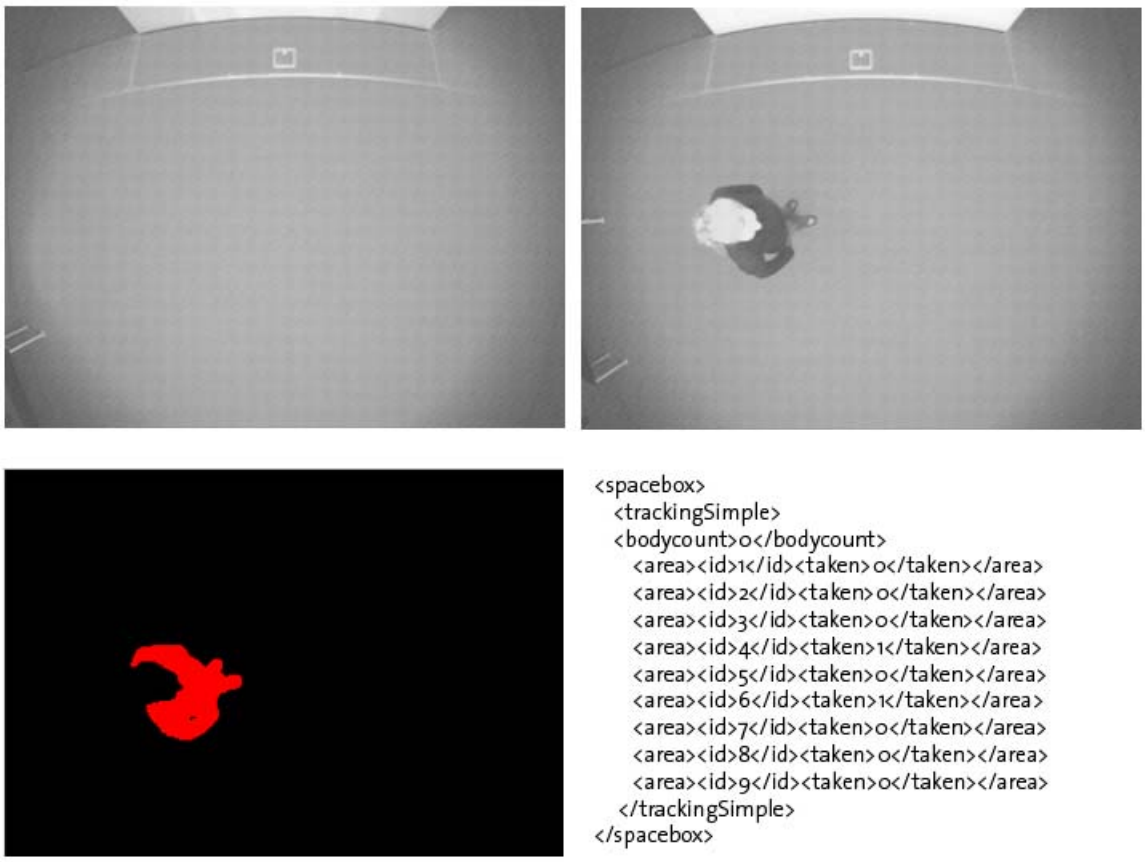

Figure 1 the comparision process

Tracking Process

Get Current Camera Image

Figure 2 live camera image

Multiply Original Image by 0.5

Figure 3 live image multiplied by 0.5

Load Background Image

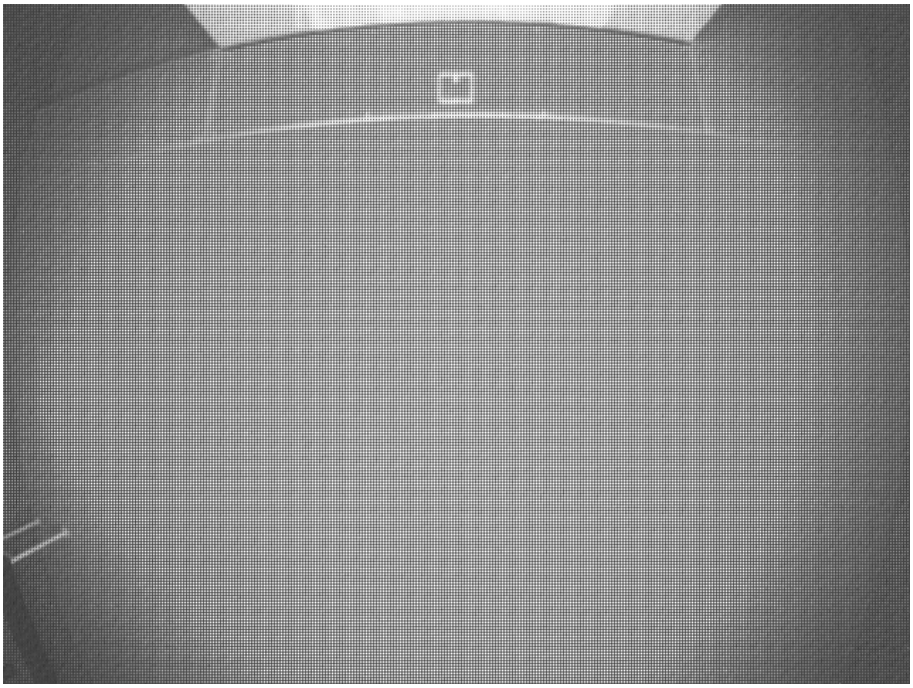

Figure 4 the background image

Reverse Background Image

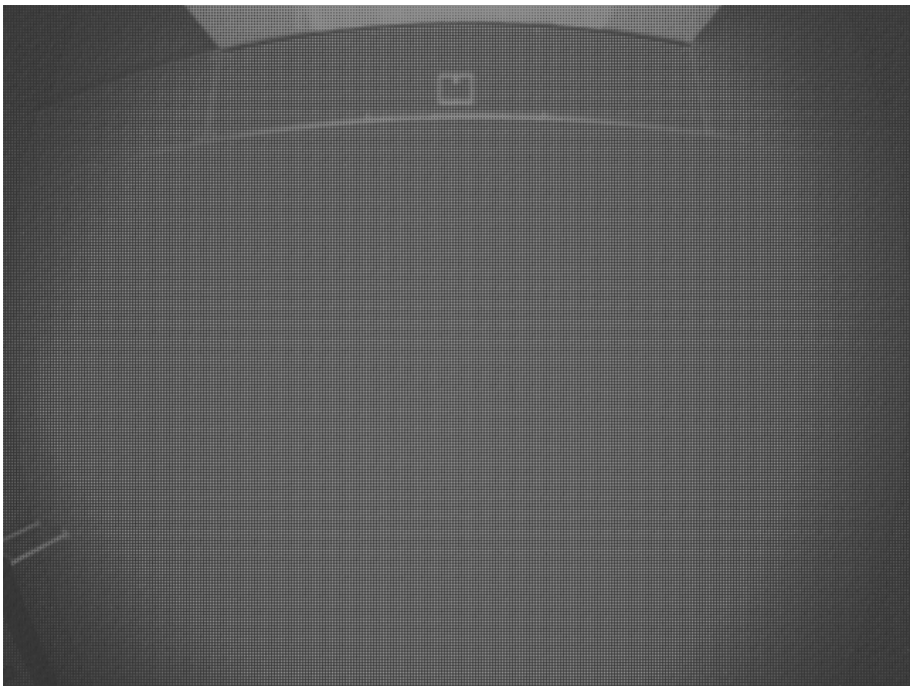

Figure 5 reverse background image

Multiply Background Image by 0.5

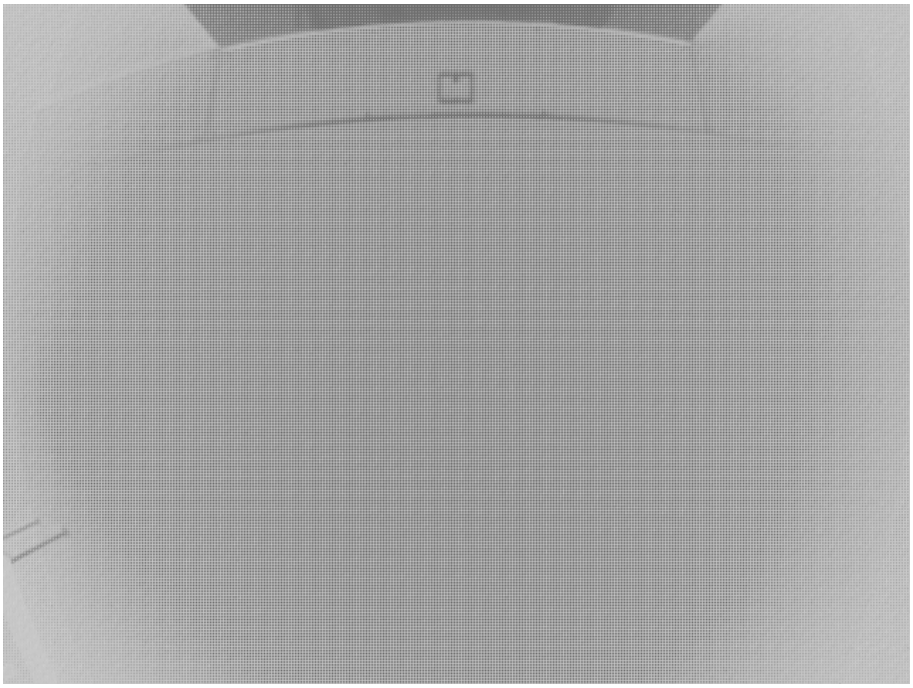

Figure 6 camera image multiplied by 0.5

Addition of Original Image with Background image

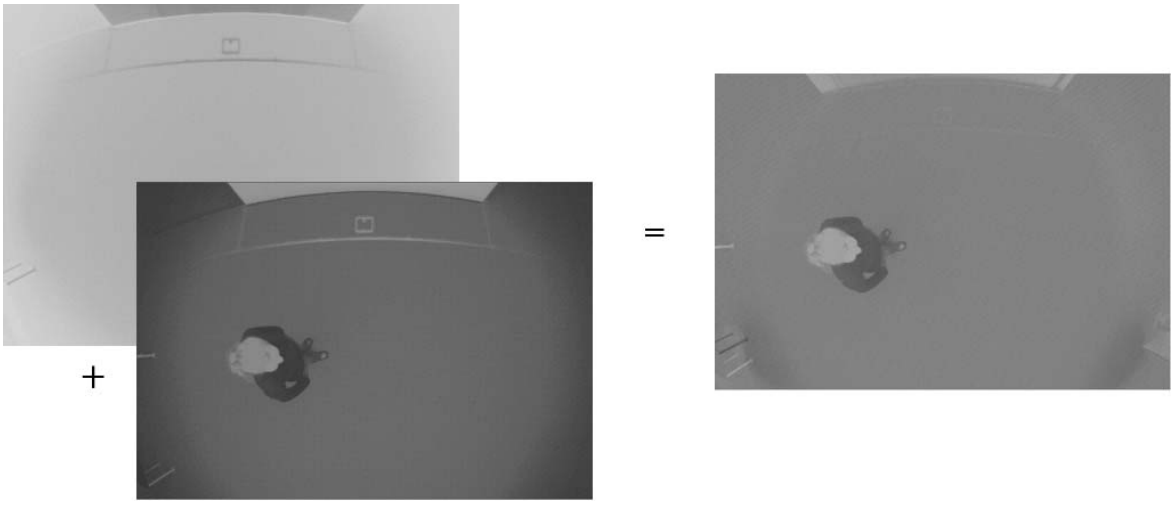

Figure 7 addition of the two images

Compute Threshold

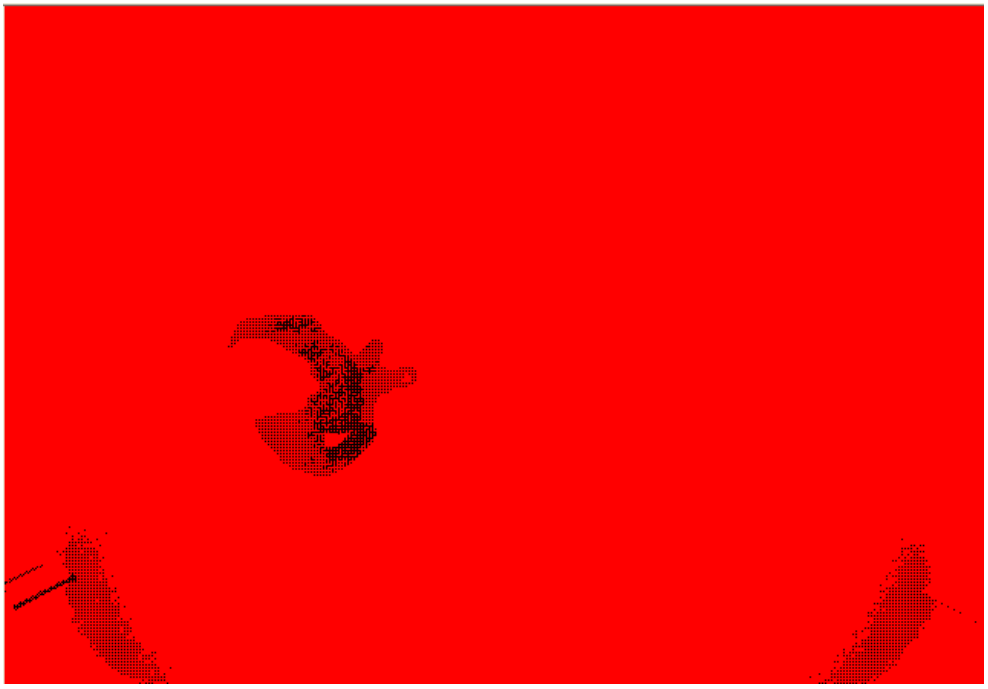

Figure 8 digital threshold of the image

Invert Binary Image

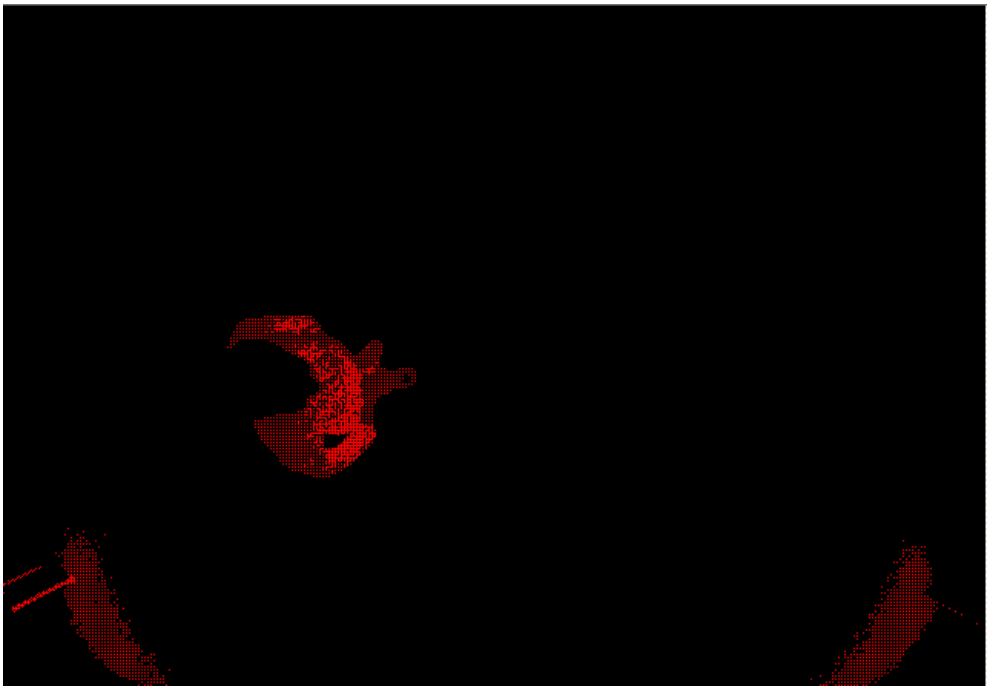

Figure 9 invert image

Dilate objects

Figure 10 dilation

Particle Filter

Figure 11 filter

Particle Analysis

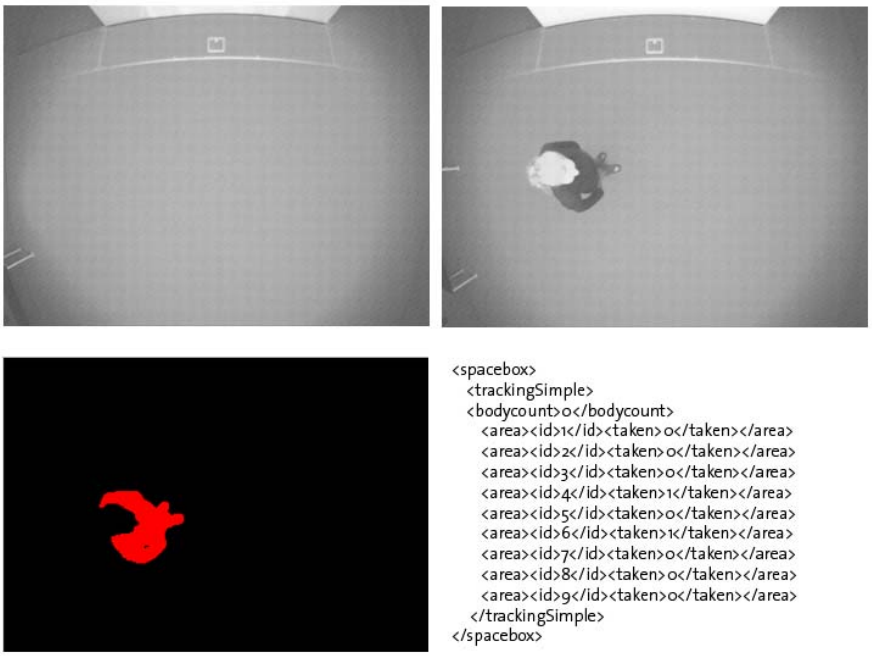

Figure 12 analysis

Overview of the processing steps in Labview

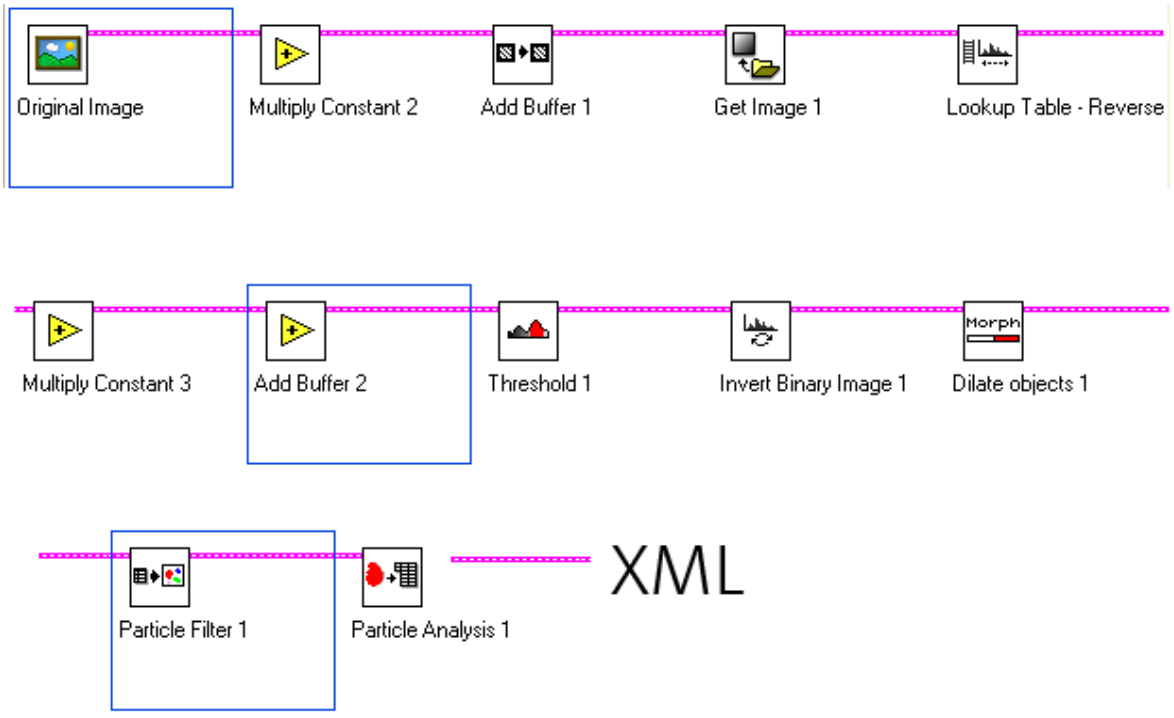

Figure 13 labview processing queue

Broadcasting Tracking Messages

The XML messages the managing platform is sending to all listening clients have the following structure and content:

```
<spacebox>
    <trackingSimple>
    <bodycount>2</bodycount>
        <area><id>1</id><taken>0</taken></area>
        <area><id>2</id><taken>0</taken></area>
        <area><id>3</id><taken>1</taken></area>
        <area><id>4</id><taken>0</taken></area>
        <area><id>5</id><taken>0</taken></area>
        <area><id>6</id><taken>0</taken></area>
        <area><id>7</id><taken>0</taken></area>
        <area><id>8</id><taken>1</taken></area>
        <area><id>9</id><taken>0</taken></area>
     </trackingSimple>
</spacebox>
```

The region in front of the projector is devided in nine areas defining the space

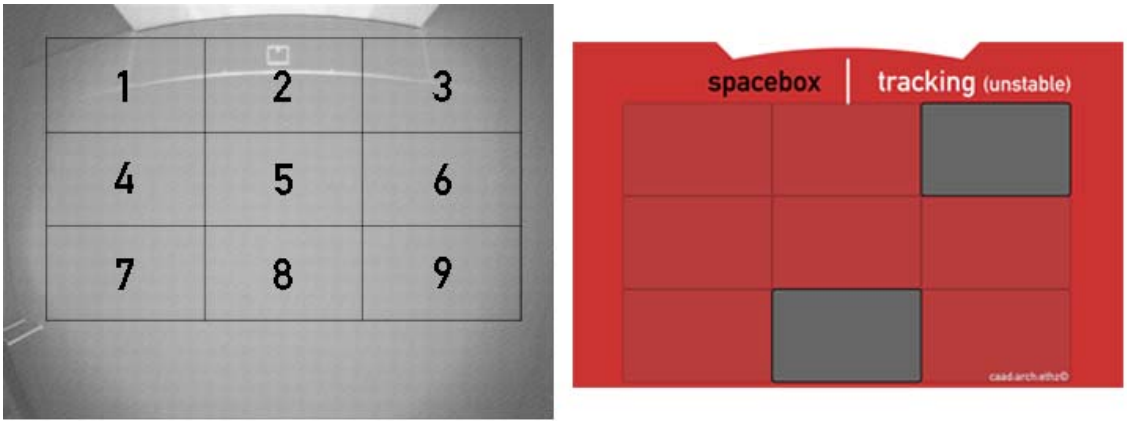

Figure 14 grid flash application

This message example tells the clients that the grid number 3 and number 8 are occupied.

Applications

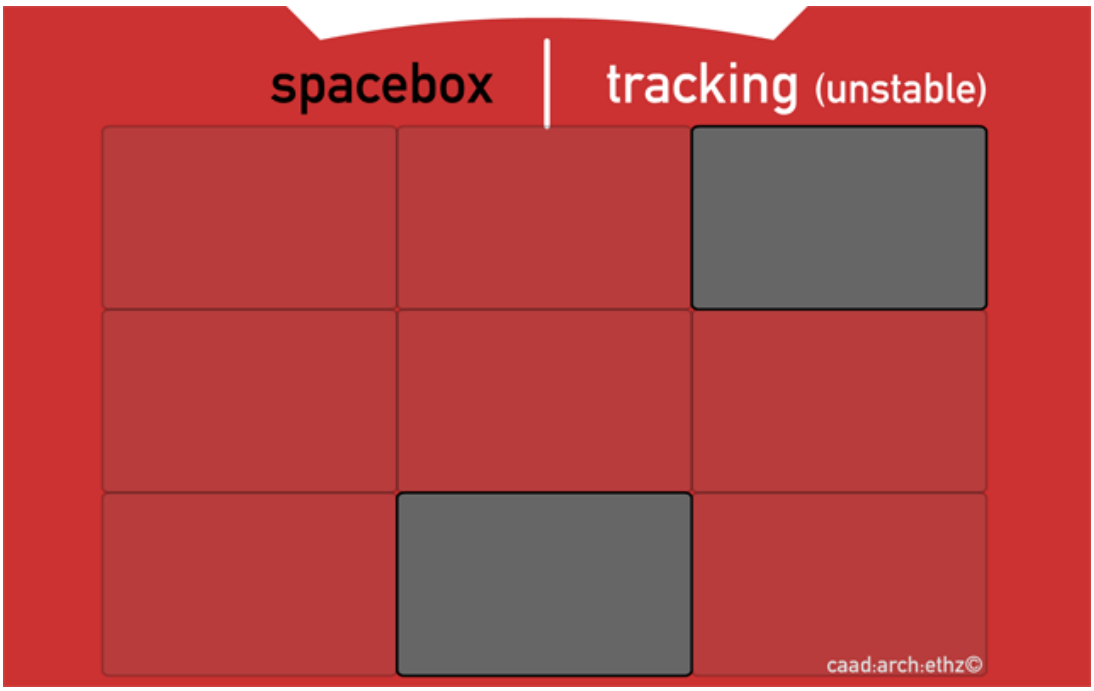

Figure 15 screenshot grid-layout

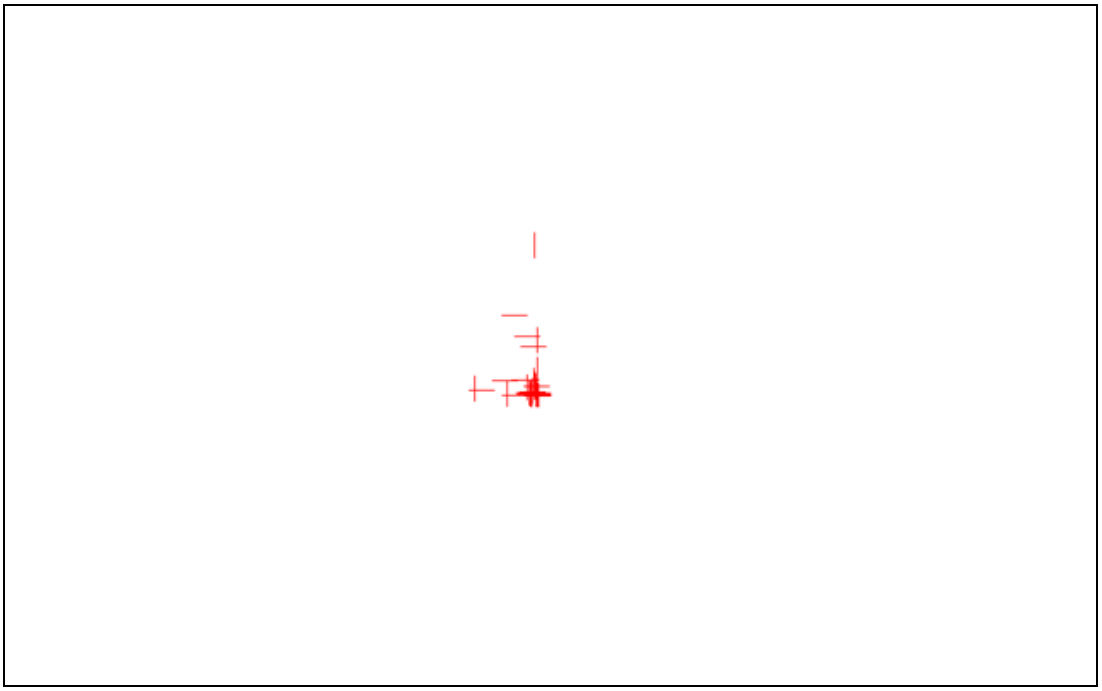

Figure 16 intelligent crosses

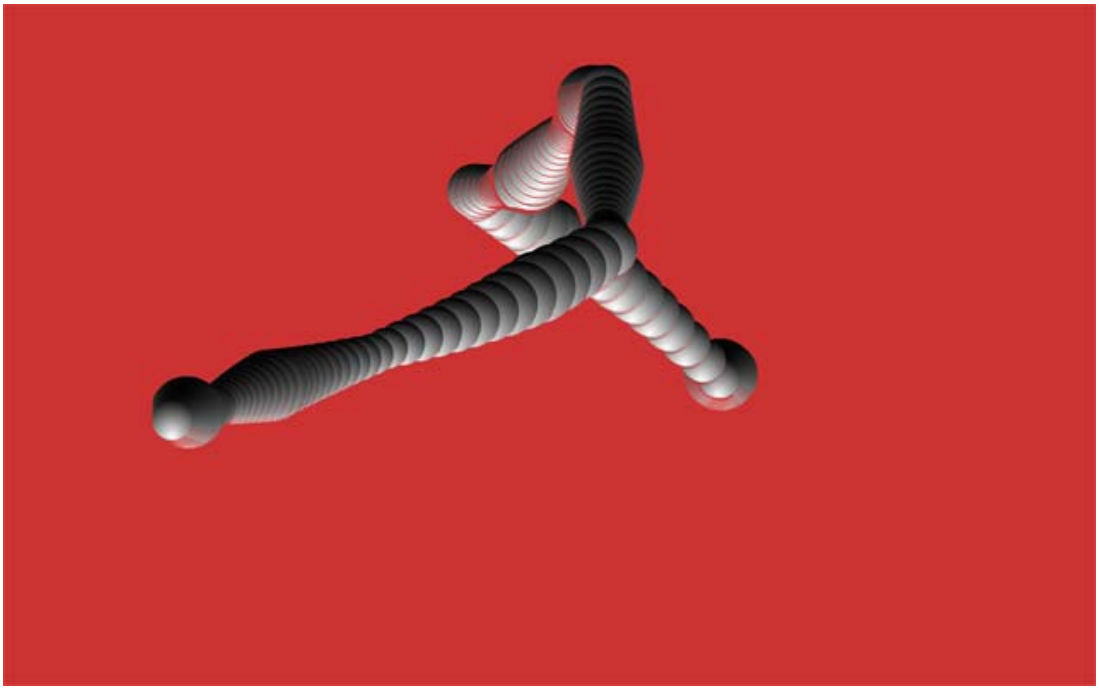

Figure 17 the observing tube

Tracking System

Hardware:

- Firewire Camera Basler
  - Basler A301 - Firewire IEEE 1394 Camera
  - Output: 640x480 15 fps

Software:

- Labview: http:// www.ni.com/labview/
  - Camera Output Processing
  - Image Comparison
- Redhell Service Management Platform based on OSGi
- Broadcast Tracking Information to all listening clients