

SynViewScan ROT - Real Time THz Range Imaging System Product Description

1. Introduction to the SynViewScan ROT System

The SynViewScan ROT systems were developed for real-time Terahertz imaging applications of distant objects. A typical application is to use it as very fast body scanner.

Its key advantages are:

- very high image refresh rate of up to 10 images per second (= image acquisition of down to 100 milliseconds!)
- very high dynamic range of up to 50 dB, allowing high-quality images
- high resolution of 1 cm
- measures the range information, leading to a much better object recognition (see 1.2 for details)
- scalable: to image larger objects, simply use a higher number of detectors

2. System Set-up

The SynViewScan ROT system is based on a scanning two-mirror telescope which is combined with a Terahertz / Millimeter wave emitter and detector array. In Figure 1 the system set-up is shown.

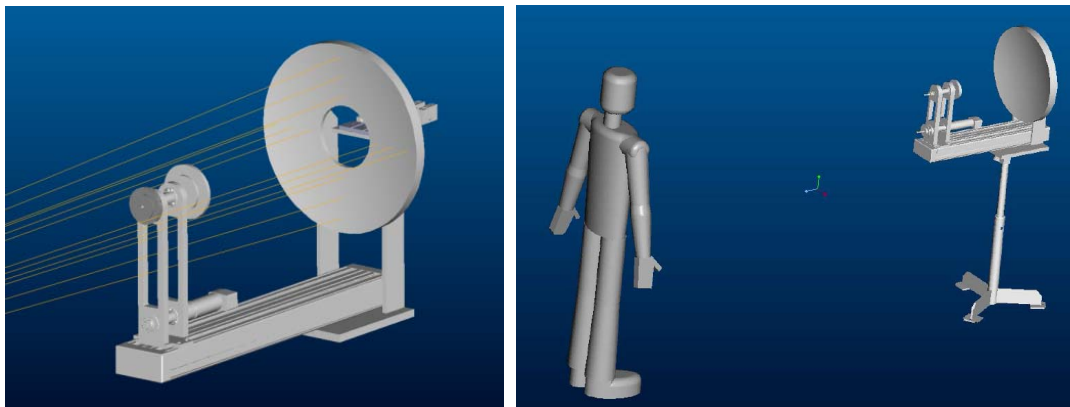


Figure 1: Left: The SynViewScan ROT system. Right: Set-up example. The system takes an image of an ellipsoidal area of 8 x 16 cm (8-Pixel system) or even 16 x 32 cm (16-pixel) in less than 400 milliseconds, leading to an image refresh rate of up to 10 Hertz (=10 images per second!).

Due to the rotating and tumbling secondary mirror of the telescope, an area of several ten centimeters by several 10 centimeters is covered in a fraction of a second. Depending on the size of the detector array, an image of an ellipsoidal area of 8 x 16 cm (8-Pixel system) or even 16 x 32 cm (16-pixel) is taken. See Figure 4 for a more detailed description of the scan area.



Every single image, independent of the used detector array, can be taken in as little as 100 milliseconds. This equals an image refresh rate of up to 10 Hertz (=10 images per second!).

At a later stage, larger detector arrays can lead to even larger scan areas. A drawing of a typical detector array is shown in Figure 2.

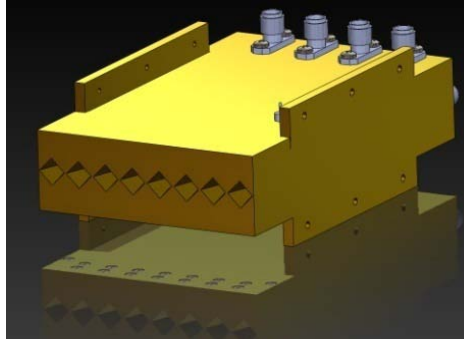


Figure 2: Drawing of the 8-pixel detector array with an 8 mm Spacing.

To illuminate the scene, a single high-quality Terahertz / Millimeter wave source is sufficient and is appropriately included in the SynViewScan ROT system.

3. Achievable Image Quality

The achievable image quality is demonstrated in Figure 3. Please note that this is experimental data. Both, the scanning concept as well as the detector array have been tested.



Figure 3: The good image quality is shown here; the hidden weapon can easily be detected. Please note that a real person is used to prove the real-world capability of the SynViewScan ROT system. Left: system setup. Right: The obtained Terahertz image.

4. Specifications

Dimensions:

| | |
|--------------------------------------|---|
| Diameter of the main reflector: | 50 cm |
| Diameter of the secondary reflector: | 10 cm |
| Distance between above mirrors: | 80 cm |
| Distance to object: | 3 Meter (4 meter from the main reflector) |



Operation Frequency

Operating Frequency: 230 – 320 GHz

Image Description:

Diffraction limited pixel size: 8-10 mm

Size of object plane:
 8 x 16 cm for 8-Pixel system = 100 effective pixel
 16 x 32 cm for 16-pixel system = 400 effective pixel

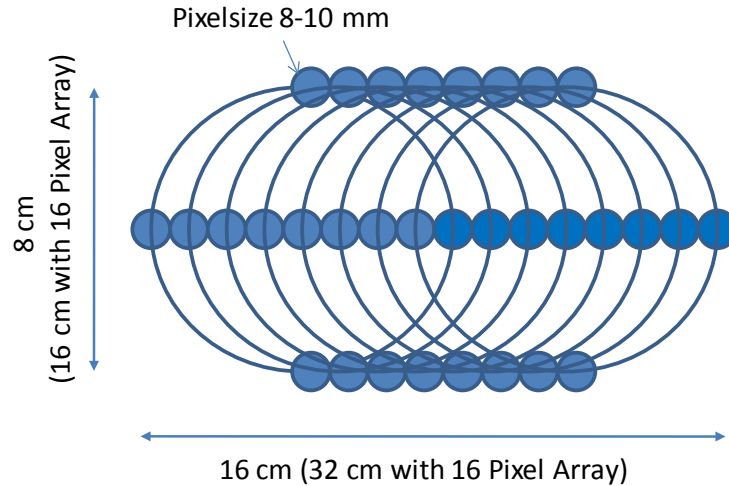


Figure 4: Sketch of the scan area for an 8-pixel system. For the 16-pixel system the number of pixels and the scan area is doubled in each dimension.

System Performance

| | <i>typical value</i> | <i>guaranteed value</i> |
|------------------------------|----------------------|-------------------------|
| Imaging speed: | 10 frames per second | > 3 frames per second |
| Dynamic range ¹ : | 40 – 50 dB | > 30 dB |
| Range resolution: | 3-5 mm | < 1 cm |

Included Software

The provided software will allow capturing, processing and visualizing the acquired image in real time. An interface to access the captured 3D imaging data, including the reflectivity and the range data, will be provided. Further processing such as multi layer range images or video overlay are not provided but can be implemented by the end-customer.

¹ Measured relative to a metallic reflector in the focus plane.



Scope of delivery

A fully operational SynViewScan ROT system:

- Optical assembly with integrated sources, detector array and scanner mechanics.
- Driving electronics for sources and a detector array.
- Data acquisition system
- Motion controller
- Control PC with Software.

Please contact us now for more information or for a quotation:

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