FULL-BODY SCANNERS

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There's going to be a lot of talk about full-body scanners in 2010. The scanner should detect illegal substances or objects hidden under clothing. But many people have different opinions on this new way of control. While one to recognize that it is necessary to protect the safety, others fear the health consequences. The following text explains the use of new full-body scanners at airports, the equipment, the impact on human health and privacy.

K e y w o r d s: scanner, full-body scanner, the millimetre wave machine, the backscatter machine.

1 INTRODUCTION

Today we define as the period for new technologies. The development of new technology products is needed in all areas of life. With the technologies we encounter, whether in industry, medicine, but also in everyday life. Therefore, great attention is paid to the development of new technologies in aviation, mainly in terms of safety. Recent attacks on aviation prompted various offices and organizations to take certain measures. One of these safeguards was the introduction of whole-body scanners at airports.

2 HISTORY OF SCANNING

Scanners are considered to have evolved from the early telephotography input devices, which consisted of a rotating drum with a single photo detector at a standard speed of 60 or 120 rpm (later models up to 240 rpm). They sent a linear analog AM signal through standard telephone voice lines to receptors, which synchronously printed the proportional intensity on special paper. This system was in use in press from the 1920s to the mid-1990s. Color photos were sent as three separated RGB filtered images consecutively, but this was used only for special events due to transmission costs. The first image to be scanned was a photograph of three month old Walden Kirsch, captured in 1957 at the National Bureau of Standards (now the National Institute of Standards and Technology or NIST). The picture was created by Russell Kirsch, the child's father, using a drum scanner.

From then on, scanners have slowly developed into the modern devices that we use today, going through a variety of models and several scanning technologies that have resulted into multiple types of image scanners.

Examples of such modern scanner is full-body scanner, which has been used in aviation.

2 TWO TYPES OF FULL-BODY SCREENING MACHINE

There are two types of full-body screening machine:

1. **The millimeter wave machine**
2. **The backscatter machine.**

1. The millimeter wave machine

A millimeter wave scanner is a whole body imaging device used for airport security screening. This is probably the one you'll find at airport right now, since there are 40 of them scattered around the 19 US airports with full-body scanning technology. It appears like a giant cylindrical phonebooth, with mostly clear glass walls and scanning panels that move around you.

Figure 1: The millimeter wave machine

Technical details

This machine emits small radio waves that pass through your clothing and returns with images of the body underneath. Clothing and other organic materials are translucent in some extremely high frequency (millimeter wave) radio frequency bands. This frequency range is just below the (related) sub-millimeter "Terahertz radiation" (or "T-ray") range. [4]

The millimeter wave is transmitted from two antennas simultaneously as they rotate around the body. The wave energy reflected back from the body or other objects on the body is used to construct a three-dimensional image, which is displayed on a remote monitor for analysis.

Privacy concerns

Privacy advocates are concerned about the use of this technology because it allows screeners to see the surface of the skin under clothing, prosthetics including breast prostheses, and other medical equipment normally hidden, such as colostomy bags. [1]

Currently the technology is able to mask some part of the bodies of the people who are being scanned. Facial features in the image are blurred before being displayed. Proposed remedies for privacy concerns include only scanning people who are detected to be carrying contraband, or developing technology to mask genitals and other "private parts." At least one government official has stated this technology is already in place, leading some to suggest that there are no privacy issues for regular passengers. In some locations, travelers have the choice between the body scan or a traditional "pat down."

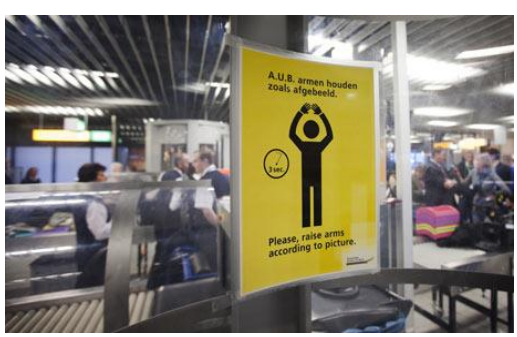

Figure 2: Instructions how to keep body inside the scanner

Possible health effects

Unlike X-rays and UV rays, terahertz photons do not carry enough energy to break chemical bonds or ionize atoms and molecules - they possess even less energy than visible light photons. However, they may still cause some legitimate health concerns for high terahertz powers. Although the human body due to its natural heat emits terahertz radiation and some scanners rely on this natural emission it is anticipated that current and future scanners will emit less radiation than is naturally emitted by other sources.

2. The backscatter machine.

Backscatter X-ray is an advanced imaging technology. Traditional X-ray machines detect hard and soft materials by the variation in transmission through the target; in contrast, backscatter X-ray detects the radiation that reflects back from the target. It has potential applications in situations where non-destructive examination is required, and can be used even if only one side of the target is available for examination.

Two low-level X-rays of you are taken within twenty seconds. If the electromagnetic waves are absorbed, then you're good to go, but if you're hiding foreign objects, then those items will reflect the rays and be visible in the scan. Radiation is not a concern; the amount you'll absorb is the same you get exposed to during everyday life. Images from this sort of full-body scanner appear more skeletal than fleshy, and you'll probably not be able to recognize your own face.[2]

Figure 3: The backscatter machine

Technology

Backscatter technology is based on the X-ray Compton scattering effect. Unlike a traditional X-ray machine which relies on the transmission of X-rays through the object material, backscatter X-ray detects the radiation that reflects back from the object to form an image. The backscatter pattern is dependent on the material property and is good for imaging organic material.

Privacy

The technology has been proposed as an alternative to personal searches at airport and other security checkpoints, since it can easily penetrate clothing and reveal concealed weapons; however, it raises privacy concerns in that it appears to screeners essentially as a nude picture of the subject, and may allow screeners to gain access to otherwise confidential medical information, such as the fact a passenger uses a colostomy bag.

Health effects

Some people are concerned with exposure to radiation emitted by backscatter X-rays. At airports, lead vests are not used and people fear being exposed to "dangerous level of radiation if they get backscattered too often."[3] Safety regulations and standards like ANSI N43.17 that govern the use of these systems and that are recognized by the Health Physics Society (HPS), FDA and Various US Government Agencies may indicate that these concerns are not warranted.

The Health Physics Society (HPS) reports that a person undergoing a backscatter scan receives approximately 0.005 millirems (or 0.05 μSv) of radiation. American Science and Engineering Inc. reports 0.009 mrems (0.09 μSv). According to U.S. regulatory agencies, "1 mrem per year is a negligible dose of radiation, and 25 mrem per year from a single source is the upper limit of safe radiation exposure". [3]

5 CONCLUSION

What are our rights? If we are at the airport where the whole body scanner and waiting in line for security check. And Think: I have to really go through the scanner? The answers are: yes and no.

YES, we should:

"Walk" this device is not required. But, nonetheless, if it will pass and we do not assume the attention, we get to our gate quickly and without arousing attention of security staff.

NO, we should not:

Currently, there is still knocked down, it is possible to force people to move the scanner where it is available. So it is our right to refuse them. They can not compel us. And when you come across on the nervous worker whose normal tour is not enough, we can be one of those who will be forced to undergo a thorough personal search (without clothes).

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