

USE OF T-DAR SYSTEM FOR SECURITY IN PUBLIC PLACES

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Abstract - : This paper deals with the use of the T-DAR system in public places, safety concern is a major issue in public areas T-DAR system can be used to deal with the safety problem faced by the authorities while maintaining security in public areas. The T-DAR system uses three-dimensional optical imaging to detect piggybacking and tailgating through mantraps, security vestibules or person traps. T-DAR system detects persons differentiates them from other objects inside mantrap and then utilizes stereo vision technology to identify and then tag each human within the field of view of tracking. Once the status of the passage is determined to be tailgating or piggybacking the system then generates a possible number of results controlled by the user interface. The alarm system uses flashlights and signaling system to deliver video to the security system.

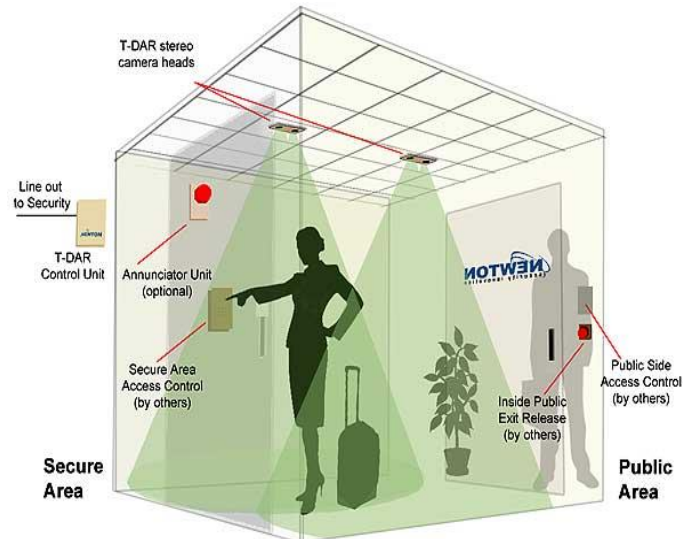
Key Words: Mantrap, piggybacking, tailgating, stereo vision technology

1. INTRODUCTION

The T-DAR system generates the highest level of anti-tailgating and piggybacking technology when installed in a mantrap airlock application.

The key part of this T-DAR system is mantrap shield. A mantrap is actually a small room designed to trap people who enter the secure area of the facility. This trap then enables security to examine the credentials of the person who has entered into the room and then allow him/her to pass through it or generates security alarm to indicate an unauthorized attempt in the premises. Mantraps are often called security vestibules are small rooms with two or more doors. The verification procedure is required either at just one door or at all the doors to secure areas. It prevents tailgating and piggybacking attempt ensuring that only one person will be available inside the mantrap before releasing to secure area.

At the center of the mantrap, the shield is T-DAR stereo vision technology. T-DAR software controls the doors which are placed in the mantrap shield and sends them the command to the doors allowing to open only one door at a time

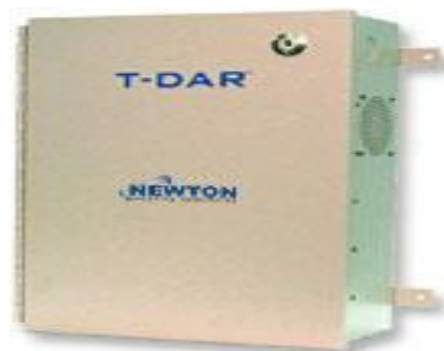


A FIGURE OF MANTRAP SYSTEM

1.1 COMPONENT OF T-DAR SYSTEM

THE basic components of the T- DAR system are as follows:

CB110MT/CB210MT/CB410MT Control Unit



Size: H 16 ½ in. X W 14 1/16 in. X D 6.0 in. (419 mm X 360 mm X 152 mm)
 Weight: 26l bs (11.7 kg)
 Enclosure: Bent steel; completely enclosed with door
 Mounting: Via 4 x ¼ in. (6.35 mm) holes on back panel tabs (optional mounting brackets available)
 Standard Operating Temperature: 40° to 110° F (5° - 43 ° C)
 (optional high and low temperature systems available)
 Storage Temperature: 0° to 125° F (-18° - 52° C)



S100 Annunciator (optional)

Size: 6.00" x 8.13 in. x 7.19 in. (152 mm X 206 mm X 184 mm)

Weight: 5lbs (2.27 kg)

Enclosure: Bent steel, with high impact plastic indicator
 Standard Operating Temperature: 40° to 125° F (5° - 52° C) (optional high and low temperature systems available)
 Storage Temperature: 0° to 150° F (-18° - 66° C)



DC200LP Stereo Tracking Head

Size: 7.00 in. x 2.50 in. x 2.50 in. (178 mm X 63.5 mm X 63.5 mm)

Weight: 2.2lbs (1 kg)

Enclosure: Bent steel

Mounting: Via 4 x 1/8 in. (3.175 mm) holes on back panel tabs (optional mounting brackets available)

Standard Operating Temperature: 40° to 125° F (5° - 52° C) (optional high and low temperature systems available)

Storage Temperature: 0° to 150° F (-18° - 66° C)



I100 Door Position Encoder

Size: 2.40 in. x 2.50 in. x 2.40 in. (61 mm X 64 mm X 61 mm)

Weight: 13.5 ounces (.38 kg)

Enclosure: Machined Delrin

Mounting: Via 4 x 1/4 in. (6.35 mm) holes on back panel (optional mounting brackets available)

Standard Operating Temperature: 40° to 125° F (5° - 52° C) (optional high and low temperature systems available)



MK200B Stereo Camera Drop-Ceiling Mounting Kit

Size: 24 1/4 in. x 6 in. (61.6 cm X 15.24 cm)

Weight: 2.25lbs (1.02 kg)

Material: Bent steel

Mounting: Once the rails are installed between the grid members of a standard acoustical tile ceiling, the camera holding plate may be moved into the best position.

Enclosure: 12 gauge (0.080 in. / 2.032 mm) aluminium sheet riveted and powder coated

Mounting: via 12 x 0.25 in. (6.35 mm) holes



Stereo Camera Head Ceiling Height Extender

A mounting kit designed to raise the camera head when the drop-ceiling height is too low. Mount the camera heads at least 8 ft. 3 in. (2.5m) from the floor.

Size: H 4.7 in. X W 14 in. X L 19 in. (119.38 mm X 355.6 mm X 482.6 mm)

Enclosure: 12 gauge (0.080 in. / 2.032 mm) aluminium sheet riveted and powder coated

Mounting: via 12 x 0.25 in. (6.35 mm) holes (three on each side tab).

Camera Mounting: via 4 x 1/8 in. (3.175 mm) holes on the top panel.

1.2 Mode of operation of T-DAR SYSTEM

Depending on installation there are 3 modes of operation for the T-DAR system:

2.1: Two access control device: Using two access control reader the public door access will not be control by T-DAR. In this setup, there will be access control reader on both the sides. With proper headcount detected, T-DAR opens the secure door after receiving a signal from the device. The access reader will allow access to mantrap when it is closed and mantrap is empty.



TWO-HEADED MANTRAP SYSTEM



FOUR HEADED MANTRAP SYSTEM

2.2: Three access control device: In three access control device only one access reader will be inside the mantrap and will send signals to the T-DAR control for opening the secure doors, for accessing device a button is required inside the mantrap. The device will allow the person locked inside mantrap to exit it without credentials. The two access device on the outside of mantrap will allow access to mantrap.



THREE ACCESS CONTROL MANTRAP SYSTEM

2.3: FOUR ACCESS CONTROL SYSTEM: In four access control system there will be two access readers on each door. Access control for inside door can be a button. Access control device located outside of the door will provide entry into the mantrap when the doors will be closed and mantrap will be empty. The public door will allow access to mantrap if there will be only one person inside the mantrap. With only one person inside the mantrap, the secure door will allow passage through the secure door only.

2. Parameters for setting T-DAR SYSTEM and EXPERIMENTAL RESULT

For using T-DAR system certain parameters are required for installing system and software for the proper functioning of the T-DAR system. Functioning of the T-DAR system depends on certain parameters. The parameters for installing system and software for T-DAR systems are:

2.1. LOCATION OF MANTRAP: Location of mantrap should be far from sunlight any change in light levels will lead to increase in false detections and false alarms.

2.2 Height of Mantrap: Minimum camera height for proper functioning of T-DAR cameras should be 8.5ft

2.3 Size of Mantrap: Mantrap size is limited and very rigid any exceeding above that limit will lead to false tracking of the system. The specifications for height, length, width are:

2.4 The maximum length of a mantrap with cameras lower than 2740mm (9ft) is 2740mm (9ft).

2.5 The maximum width with cameras lower than 2740mm (9ft) is 1450mm (4.75ft).

2.6. The maximum length of a mantrap with cameras above 2740mm (9ft) is 3000mm (10ft).

2.7. The maximum width of a mantrap with cameras above 2740mm (9 ft.) is 1500mm (5ft).

2.8. The setting of cameras, video cables: For proper installation of cameras the recommended height for setting are:

For camera heights below 2740mm (9ft), space the two camera heads no more than 1400mm (4.5ft) apart.

o For camera heights above 2740mm (9ft), space the two camera heads no more than 1500mm (5ft) apart.

o For camera heights below 2740mm (9ft), ensure there is no more than 700mm (2.25ft) from each camera head (camera center) and all adjacent doors and walls.

o For camera heights above 2740mm (9ft), ensure there is no more than 760mm (2.50ft) from each camera head (camera center) and all adjacent doors and walls.

2.9. USE OF VIDEO CABLES]

For efficient performance of the system, strong video signals are required use of following video cables will generate maximum results: For the coaxial camera cables, it is highly recommended to use compression fittings rather than crimp-on fittings.

☑ Ensure that video cables are well separated from any power circuits and cables, solenoid locks, automatic door hardware, motors, and vibrations.

☑ All T-DAR video cable runs need to be isolated in steel conduit, not shared with another wiring.

☑ Video cable runs should be uninterrupted, with no junction points or splices

2.10. Installation of Software for T-DAR SYSTEM

After setting mantrap system the next step is the setup of T-DAR system software, interfacing of software with the system is done through the user interface the installation of the user interface is done in following way:

1. Insert the T-DAR software into host PC
2. Browse the CD ROM and execute setup.exe
3. Follow the screen given on screen
4. After the software is loaded, launch the UI from the start menu on the host computer

2.11 CONNECTION TO COMPUTER

1. **Configuring the TCP/IP CONNECTION:** The factory sets TCP/IP connection to automatic. Changing these setting will establish a connection to T-DAR software.

2. After applying above settings click MY NETWORK PLACES and select Properties, in properties window select local area connection new windows will open select TCP-IP and its properties.

3. A selection box labeled Use following IP address will appear to select this option.

4. Enter the following information in the window appear IP: 10.3.10.x (use a number, one higher; if x is 51, use 52) Subnet: 255.0.0.0 Gateway 10.0.0.1 (this may be left blank)

5. After entering the IP address connect the T-DAR system to the host computer using Ethernet cable a green light will glow which verify that the connection is secure.



1. When the connection is verified insert the T-DAR software CD ROM and locate the control box directory and run update.exe

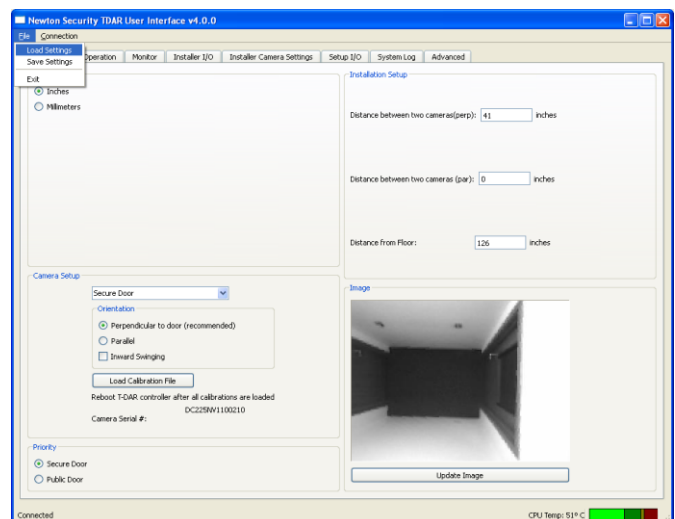
2. If prompted while running software enters the IP address of control box. Locate the IP address on inside of the control unit If IP address is changed enter latest address

3. Follow the instructions appear on the screen.

2.11: TESTING OF MANTRAP

After the interfacing of software, the next step is the testing of the mantrap system. This can be accomplished by having two people walk into the mantrap through the public door. When two people will pass through the public door an alarm will be generated when the annunciator will announce "Only one person allowed inside the mantrap".

For checking captured images and cameras monitor the tracking view on the upper left of the video output. The tracking view should be black if it is not black calibrate the camera head and then check two sample video images they should be completely stable without distortion if they are unstable go for troubleshooting option.



THE IMAGE SHOULD APPEAR BLACK LIKE THIS

2.12. Experimental results of setting T-DAR SYSTEM.

The experimental set up of T-DAR system set up in Salt Lake City International Airport Terminal 2. The system is installed in the 48-inch pedestrian door leading from public baggage area into secure baggage makeup area. With its set up on average the system has been used to grant 1,000 access on an average each day, apart from granting access to the people these doorways also used for bring oversized fragile articles, such as pet crates and kennels into the baggage claim area, and for moving high volume overflow baggage to the explosives detection system located in the secure baggage make-up area. The experimental set up demonstrated the capabilities to handle large traffic area and as result, the airport authorities also used for piggybacking and tailgating detection. The system is then interfaced with airport's NEX watch system. The alarm information is processed through the access control field panels and is ultimately displayed on a monitoring console in the control center where the operator can simultaneously evaluate the alarm information from the access control system and the video from the event camera at the T-DAR location.



Overhead view of Mantrap system set up in Airport



Card swipe and biometrics add essential layers to the setting of Mantrap system

3. CONCLUSIONS

Security has been a concern for every country in public areas, especially tailgating and piggybacking are the major issues that every country is facing after any terrorist attacks. T-DAR system can play a major role in dealing with these issues there are certain advantages that this system has over other present security systems. The cost of setting T-DAR system is very low compared to other security systems, apart from that the low false alarm rates, detection of explosives and capability of handling the security of thousand people at a time make T-DAR a better security module.

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