

Stadium Security In a Changing Environment



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Background on Recent Stadium Terrorist Events

Manchester Stadium (May 22, 2017)

- Explosive device concealed in a black vest or a backpack detonated after the concert ended
- Only a bag check was in place according to news reports
 - Other screening methods were not used in this location at the time of the attack.

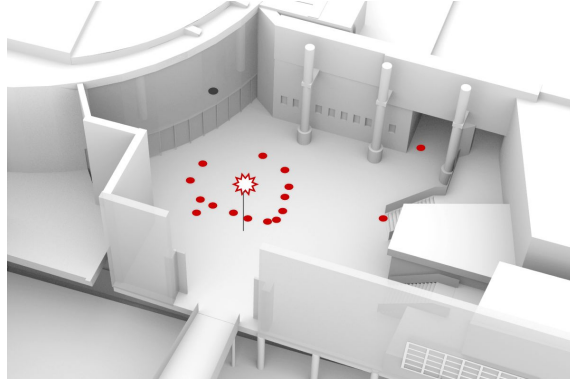


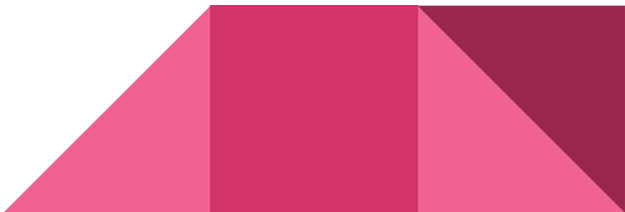
Photo credit: New York Times

Background on Recent Stadium Terrorist Events

Paris attacks (November 13, 2015)

- Multiple coordinated attacks throughout Paris: soccer stadium, smaller concert hall, others.
- All attackers wore explosive vests at the large soccer venue
 - Security was able to identify the first attacker, preventing him from entering.
 - This deterred the other 2 attackers at that location.

Istanbul (December 10, 2016)

- A car bomb was detonated outside Vodafone Area two hours after a soccer match ended.
 - A Second explosive was detonated by the bomber wearing a suicide vest in an adjacent park.
 - Both bombings targeted mainly police officials.
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Our Project

1. **Experiments on Walk Through Metal Detectors (WTMDs)**
2. **Data Collection and Analysis at a Live Stadium Event**
3. **Video Data Analysis from Stadium Event**



Our Project: 1. Experiments on WTMDs

1. Make Test Object (safe/fake) “Explosive” Vest(s) (just metallic items)

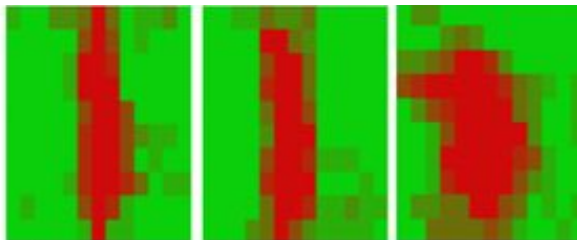
→ Test to see how well WTMD catch metallic Vest(s)

- Creating a test object representative of explosive vest(s) containing similar metallic objects (nuts, screws, nails) with different distribution/objects



2. Checking how human gait may impact WTMD detection of metallic objects

- Create heatmaps of vulnerabilities
- Test items to be used correspond to NILECJ 0601.00 standards for WTMDs (to meet a certain quality level)



Literature Search

Prior Work:

Walk-Through Metal Detectors and Stadium Contraband (Nelson et al, 2016)

- Experiments on how multiple real stadium contraband used as test objects affected detection.

Performance of Walk-Through Metal Detectors against Curvilinear Motion (Nelson, 2017)

- Experiments on how different walking pattern affected results of WTMDs

Walk-Through Metal Detectors for Stadium Security (Nelson et al, 2016)

- Experiments to discover potential vulnerabilities of WTMDs and observe their operation at large live events.

Experimental Design:

- “An Experimental Design is the laying out of a detailed experimental plan in advance of doing the experiment.” (NIST, 2012)



Our Project: 2. Data Collection and Analysis

- Work with CCICADA Stadium Security Project Research Team
- Observe and collect data on WTMDs at MetLife at upcoming U2 concert

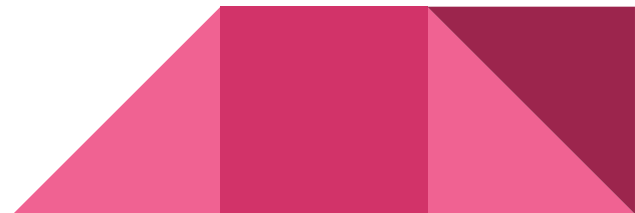


Photo Credit: Metlife Stadium Website

Our Project: 3. Video Analysis

If time and video footage made available:

- Compare data collection from video data versus human collection and analyze their differences
- Look for implications of Parkinson's law in Security Screening at Stadiums (following a 2007 study of airport security)



Acknowledgements

We thank CCICADA/DIMACS for funding our project.

We look forward to working with the CCICADA Stadium Security Research Team.

We also look forward to working with the US Air Force visiting researchers.

Our mentor Dr. Christie Nelson



References

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