Engineering Crowd Management for Public Safety
The Port Authority of New York and New Jersey (PANYNJ) is tapping a high-tech approach developed by the DHS S&T Center for Visualization and Data Analytics (CVADA) at Rutgers to enable safer crowd movement during emergencies and other events. The CVADA-Rutgers research team uses a combination of mathematical modeling and LiDAR (light and radar) to determine the best way to manage rush-hour crowds and bus schedules—including emergency evacuations—before, during, and after PANYNJ’s major reconstruction and rehabilitation construction projects.

LiDAR Technology Employed
CVADA-Rutgers employs LiDAR, a remote sensing technology that captures the precise dimensions of facilities and can be extremely useful in analyzing proposed redesigns. The LiDAR imaging identifies potential obstacles to crowd movement, such as doors, gates, ramps, retail stores and the like, providing important input to the PABT crowd-management study. This led to the development of a Building Information Model that supports a variety of facility management functions critical to the safe, efficient, and effective operation of a large transportation facility.

This project is funded by the Port Authority of New York and New Jersey and the DHS Science and Technology Directorate.

How It Works

To simulate crowd movements, CVADA-Rutgers researchers capture and analyze data related to pedestrian traffic flows and bus schedules at the terminal. They study how individuals move differently when carrying luggage, buying a snack, acting unsure of where to go, and how groups of two or more people behave, as social groups move differently than individual pedestrians. This data is then used to develop computer simulations of crowd movement. The simulations show how the different phases of the planned reconstruction of the terminal are likely to impact crowd movement, which can help the Port Authority design pathways that facilitate people flow.

Real Users, Real Results
The Port Authority of New York and New Jersey is currently using this CVADA-developed tool to plan for reconstruction of their bus terminal.

CVADA’s PABT crowd-management study documents and analyzes obstacles to pedestrian movement such as doors and gates. Photo credit: Yoshizumi Endo, Creative Commons

CVADA at Rutgers is using advanced data analysis, mathematical/computer modeling, LiDAR technology, and field observations to simulate and predict crowd movements in the PABT reconstruction project.

To learn more about tools for Analyzing Crowd Movement, contact the DHS S&T Office of University Programs at universityprograms@hq.dhs.gov.