Designing Mechanical Arms to Use on Flood-Prone Bridges to Save Lives

Sanchez, Eduardo (School: Jose Collazo Colon)

The purpose of the investigation is to save lives. The project emerges from the concerns regarding the dangerous conditions of bridges in Puerto Rico and how these have already taken a toll on human lives. The research question is: What mechanical arm design is most effective in alerting the community when water levels in bodies of water rise in Puerto Rico? The following hypothesis was established: a mechanical arm connected to a buoy that measures the water level of bodies of water, and as the level rises, the mechanical arm will close transit access on bridges that are vulnerable to flooding. A model was constructed using a plastic container with liquid simulating a body of water. A bridge was designed using cardboard with two mechanical arms made of Lego. A polystyrene ball, divided in half, was installed to simulate water-level buoys. These buoys were installed at each mechanical arm. Various water level tests were conducted to determine the most effective angle of the Mechanical arms. The best angle was found and modified to be more effective in the second prototype. The investigation concluded with a model simulating a river and a bridge with two mechanical arms that were connected to buoys. When water levels increased, the buoys triggered the mechanical arms to close traffic access over the bridge and no lives were lost. This mechanical arm is a sustainable, innovative design never seen before to prevent people from putting their lives at risk.

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