

**HI-012a**  
**Active Sensing Monitoring for the Newark Airport Monorail Guideway**

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**Abstract**

The primary goal of this project is to develop a real-time monitoring system that can identify adverse defects within the Newark Airport Monorail Guideway and continuously monitor its structural integrity. A monitoring system will be developed by (1) permanently embedding active sensing devices such as lead zirconate titanate (PZT) into the guideway for both actuating and sensing guided waves and (2) by continuously and autonomously processing the data to identify the initiation and growth of defects. Defects of particular interest in this project include detachment of steel studs from a steel girder's flange, debonding of the top running surface layer from the flange, and crack development near the connection between the flange and the web. A scaled model of the guideway will be built at Carnegie Mellon University to validate the usefulness of the proposed monitoring system. While existing projects mainly focus on detecting fatigue cracks or debonding in simple plate or beam structures, this proposed research intends to extend the PI's ongoing research in active sensing to more complex structures. This imposes various technical challenges because the wave propagation characteristics in such complex structures are very different from those found in plates or beams. Therefore, fundamental understanding and research in guided wave propagations should be performed in parallel with experimental investigation.