TIDC Transportation Infrastructure Durability Center AT THE UNIVERSITY OF MAINE

UTC Project Information	
Project Title	Electromagnetic Detection and Identification of Concrete Cracking in Highway Bridges
University	University of Massachusetts Lowell
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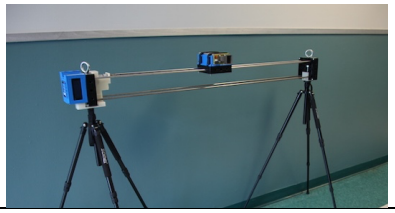
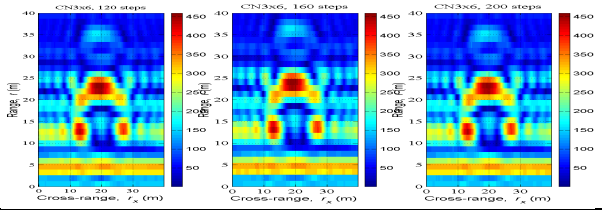
Funding Source(s) and Amounts Provided (by each agency or organization)	Fast-Act (Federal): $330,495 (Y1 ~ Y5) UMass Lowell: $339,446 (Y1 ~ Y5) + $60,000 (Y3)
Total Project Cost	$330,495 (Year 1 ~ Year 5)
Agency ID or Contract Number	ORCID.org ID Number: 0000-0001-7532-3574
Start and End Dates	01/01/2019 ~ 12/31/2023
Brief Description of Research Project	The problem we are trying to solve is the structural assessment of aging concrete bridges (reinforced and prestressed) in New England, targeting at concrete cracking and degradation (e.g., carbonation, alkali-silica reaction). The problem is important because that the integrity of concrete cover indicates not only mechanical strength of the cross section but also the level of protection for steel corrosion. Concrete cracking and steel corrosion can occur to any component in concrete bridges. We propose to 1) conduct field radar inspection (using ground-penetrating radar (GPR) and synthetic aperture radar (SAR), and impact-echo) for 2D and 3D radar imaging and to 2) develop a damage detection model for predicting the level of structural damage for concrete bridges.
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	We have developed a portable SAR imaging sensor capable of wirelessly transmitting data from the sensor to an adjacent laptop computer. The imaging capability and wireless data transmission have been validated in the laboratory.  
Impacts/Benefits of Implementation (actual, not anticipated)	This project will enhance the transportation infrastructure durability as follows: • Correlation between our proposed radar technique (remote synthetic aperture radar or SAR) and a commercial radar technology (ground penetrating radar or GPR) can help bridge inspection engineers to use remote sensing for crack detection and quantification.

	• Field application of electromagnetic sensors for subsurface sensing such as sink hole detection.
Web Links • Reports • Project website	• We have submitted our quarterly progress report for September 30, 2021. • Updates of research activities are posted on our project website at https://www.uml.edu/Research/tidc/projects/electromagnetic-detection-identification-bridge-cracking.aspx