



ACCELERATED BRIDGE CONSTRUCTION
UNIVERSITY TRANSPORTATION CENTER

UTC Project Information	
Project Title	Robotic Bridge Construction: Experimental Phase I
University	FIU
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Funding Source(s) and Amounts Provided (by each agency or organization)	ABC-UTC Funds: \$45,000 Match Funds: \$22,500
Total Project Cost	Total Funds: \$67,500
Agency ID or Contract Number	Accelerated Bridge Construction University Transportation Center (ABC-UTC) 69A3551747121
Start and End Dates	2020/01/01- Active
Brief Description of Research Project	<p>Robotics and Automation are widely used in several industries such as automobile, electronics, and aerospace mainly due to the nature of their massive production and design standardization. Unlike other industries, construction industry leaders are reluctant to integrate automation and robotic applications in their construction techniques due to unsuitability of most current conventional design to the available automation and robotics applications; the nature of large scale construction activity; material limitations; managerial concerns; and the lack of comprehensive proven research findings and guidelines related to robotics and automation in construction field. Many challenges are associated with current robotics and automated techniques such as limitations in developed 3D-printed materials; the inability of most developed 3D-printed materials to sustain standard structural loading; and challenges of 3D-printing with reinforcement which is essential for structural elements to achieve the designed capacity. In ABC-UTC the research team proposed a step forward toward automating bridge construction “Robotic Bridge Construction” by constructing and experimentally testing bridge elements made through robotics and automation. This project is the second phase of the ongoing project of “Robotics and Automation in ABC Projects: Exploratory Phase- ABC-UTC-2016-C2-FIU05”. In the exploratory phase, the PIs are identifying suitable materials, ultra-high performance concrete”, suitable robotic systems “mobile robot and 3d-printing system”, and suitable prefabricated bridge elements “UHPC</p>

	shells for bridge columns and beams”. Research objectives include: (1) Material level testing for the proposed ultra-high performance concrete (UHPC) design mixture for automation. The material selection is being developed under the exploratory phase of this project. (2) Construction of UHPC shell for beams and columns using automated systems or robot which are both developed under the exploratory phase. (3) Large scale testing of the robotic bridge elements (UHPC shells for beams and columns) and comparison with those constructed using conventional construction. (4) Preliminary investigation on robotic and automated construction for repair and retrofit for field application.
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	This is an active research project. Upon completion, outcomes will be reported.
Impacts/Benefits of Implementation (actual, not anticipated)	Approached by NASA to be part of research project for Artemis
Web Links <ul style="list-style-type: none"> • Reports • Project website 	https://abc-utc.fiu.edu/research-projects/fiu-research-projects/robotic-bridge-construction-experimental-phase-i/