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A smart robot system for non-destructive testing of the concrete structure

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Assessment of existing reinforced concrete structures plays an indispensable role in structural safety especially for structures subjected to severe loading conditions or had been built based on old standards. One of the most common methods of assessment is the use of Non-Destructive Test (NDT). Handheld NDT may not be possible in some structures, thus using robotic NDT provides the necessary tools to access these structures. As a demonstration of the technique, an experimental program was performed. Nine beams assessed and tested for using the new technique. The experimental program consisted of three different groups; the first group was undamaged control beams. The second group contained de-bonded of reinforcement bars at the beam ends. Finally, the third group contained specified voids in maximum compression area of the RC beam. Moreover, it should be noted that the loading level of control beams was carried out at two ranges 50% and 100 % of maximum load capacity. Hand-held NDT and robotic NDT tests were performed at each load step. The same concept was used for two other groups by consideration three loading levels, 50%, 75% and 100% of maximum capacity. The results showed that the robotic NDT matched the hand-held NDT for the two instigated damages in this program.

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