IART 041
Application of RFID Technology to Infrastructure Monitoring

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Abstract
Failure of concrete structures as a result of salt infiltration and corrosion of reinforcing rods is a major problem. We seek to develop sensors which can be embedded in concrete structures and which can be periodically interrogated to determine the chloride concentration. This would allow the prediction of incipient failure and also provide for more effective maintenance.

We propose to adapt presently available RFID (radio-frequency identification) technology for infrastructure monitoring. There are presently a range of sensors either available or in an advanced stage of development which can be permanently attached to or embedded in various structures. Examples include accelerometers, strain gauges, electrochemical chloride-sensing cells, acoustic emission transducers, and ultrasonic flaw detection transducers. One important element which is missing is the link between the embedded sensor and the outside world. We propose to integrate existing RFID chips with available sensors. This project will demonstrate communication with sensors for one specific important application, namely, detection of chloride ion infiltration in concrete structures. We will also develop a knowledge base concerning RF communications range and evaluate the practicality of extending this work to additional sensor types.