# Predictive Maintenance in Bridge Infrastructure

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**Abstract***: Predictive maintenance, driven by artificial intelligence and data analytics, represents a transformative approach to infrastructure management. By continuously monitoring asset conditions through sensors (Vibration, Temperature, crack, moisture and corrosion, 3D vision sensor and Ultrasonic & sonic) and advanced algorithms, predictive maintenance can forecast maintenance needs before infrastructure failures occur, leading to efficient scheduling, reduced costs, minimized downtime, and improved safety. Beyond cost savings, this approach enhances sustainability by optimizing resource usage, extending asset service life, and reducing environmental impact. Real-world applications in road infrastructure and the power sector demonstrate its potential to ensure reliability, prevent accidents, and meet the growing demands placed on critical infrastructure. Embracing predictive maintenance technologies is essential for addressing 21st-century infrastructure challenges effectively and safeguarding the well-being of communities.*

**Keywords:** Predictive Maintenance, Bridge Infrastructure, Structural Health Monitoring, Sensor Technology and Data Analytics