

Comprehensive Guide: AI-Powered Predictive Maintenance

Step 1: Define the Scope

■Core Features:■- IoT-Based Structural Health Monitoring: Detect vibrations, stress, and strain in real-time

Step 2: Collect & Prepare Data

■1. IoT Sensor Data for Predictive Maintenance:■ - Z24 Bridge Dataset: Sensor readings of a bridge in S

Step 3: Develop AI Models

■1. AI Predictive Maintenance (Time-Series Forecasting)■ - Goal: Predict stress anomalies in bridge stru

Step 4: Develop Digital Twin

■- Bridge Simulation in Unity 3D. ■- Use OpenStreetMap to Model Bridge Structure. ■- Integrate Sensor Data

Step 5: Deploy the Solution

■1. Edge AI Deployment (Real-Time Monitoring) ■ - Deploy computer vision models on NVIDIA Jetson Nano

Final Deliverables

■- LSTM-Based Predictive Maintenance AI. ■- YOLOv8 Crack Detection System. ■- Digital Twin for Structural Health

Next Steps

■1. Download datasets & preprocess sensor + crack images. ■2. Train LSTM & YOLOv8 models for prediction

Why This Project is the Best?

■- Solves a Real NJ Transit Challenge – Prevents future failures & reduces downtime. ■- Uses Cutting-Edge