# Demonstration on Efficient Sewer Management System Using Advanced Image-recognition Technology

*Implementer : The consortium of Funabashi City, JS, and NEC Corporation*

Efficient and low-cost sewer inspection with a massive amount of data achieved by leading-edge technologies (image recognition, sensing, mechatronics)

## Technology Overview

*Sewer inspection using TV camera*

- High travelling performance
  → Adaptive to long-distance inspection
- Advanced image recognition technology
  → Detect problems automatically
- Sewer management technology using ICT
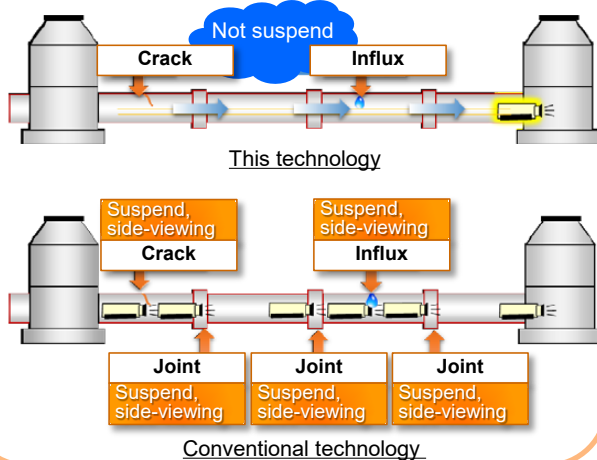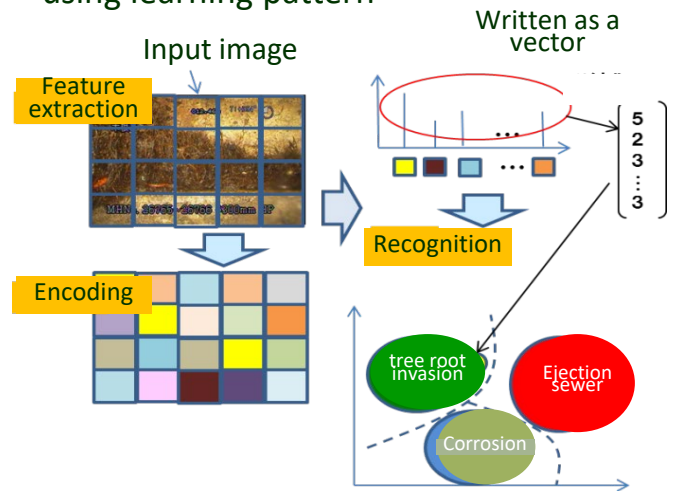  → Create a database from inspection results



*Operation with game controller*

*Image recognition camera*

### Comparison with the conventional camera



Not suspend

**Crack** | **Influx**

This technology

Suspend, side-viewing **Crack** | Suspend, side-viewing **Influx**

**Joint** | **Joint** | **Joint**
Suspend, side-viewing | Suspend, side-viewing | Suspend, side-viewing

Conventional technology

### Learning image recognition

1. Divide input image into multiple parts to extract their features
2. Encode input images
3. Group examples into similar category using learning pattern



Input image

Written as a vector

Feature extraction

Recognition

Encoding

$\begin{bmatrix} 5 \\ 2 \\ 3 \\ \vdots \\ 3 \end{bmatrix}$

tree root invasion

Ejection sewer

Corrosion

## Achievements  *Comparison with the conventional self-propelled TV camera*

- Traveling performance: detectable to internal diameter of φ200 to 700,  span length of 500 m
  - ➢ Require no cleaning for 20% or less sediment
  - ➢ Require no water stop except for a camera submerged
- Image recognition performance: detectable ten kinds* of anomaly.
  - **Rank A corrosion or rank a damage having negative impacts on sewer can be found with 75-86% accuracy.*
- Reduce inspection costs by 40%, and  improve daily travelling distance to 160%