

# MIZUTANI LAB.



## 4D Transparentization of Infrastructures with Nation Wide Scale

Department of Human and Social Systems

Real-Time Spatial Analysis

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<https://mizutanilab.iis.u-tokyo.ac.jp>

Now that aging infrastructure is a global problem, including Japan, innovation in maintenance and management technology is essential. Mizutani Lab. uses such state-of-the-art devices as Radar and LiDAR for high-speed observation and fully automated processing to see through the three-dimensional shape of structure surfaces, internal structures and damages. Also, our new keyword is **“Four-Dimensional Transparentization”** focusing on time-varying information of infrastructures.

Point cloud data of construction sites using smartphones

High speed LiDAR

Large-scale point cloud data analysis for 2D diagnosis of infrastructure surfaces

### Visible Space

### Invisible Space

3D subsurface visualization of internal damage of bridges

Bridge deck

Rebar

Segregation

- Surfaces
- Rebar mesh
- Damage

### Quantitative evaluation of internal cracks in structures using handy radar

Time wave form (FR)

Depth (mm)

Amplitude (-)

Distance (mm)

120mm

actual thickness = 120 mm, estimated thickness = 130 mm

120mm

クラック厚さ推定

Frequency (GHz)



Depth Estimation

Contains of identical hyperbola shapes

Color = wave size

Potential line

Set minimum distance

Segmentation

Noise

Point cloud (candidate hyperbola apex)

Detected Pipes

Extraction and mapping of buried pipes by Digital Signal Processing of Ground Penetrating Radar (GPR) images

