

# SAKAMOTO LAB.

## Sound environment in architecture and city

Department of human and social systems



Environmental Acoustic Engineering

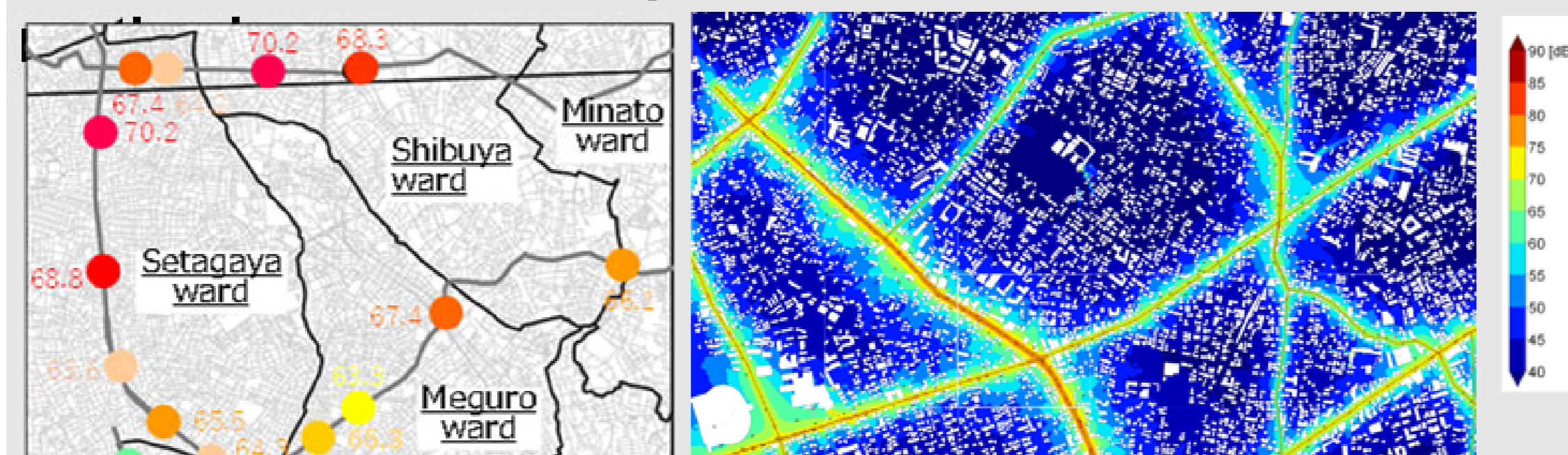
Department of Architecture, Graduate School of Engineering

<http://www.acoust.iis.u-tokyo.ac.jp/>

Sounds surround our lives. Sounds have great impacts on our quality of life. Sakamoto laboratory treats various issues on acoustic field control, measurement, prediction and assessment in order to realize better sound environment in architecture and city.

- ◆ **Acoustic measurement:** Impulse responses, Sound insulation, Sound reflection and absorption
- ◆ **Building acoustics:** Sound insulation of building façade and room walls, sound absorption
- ◆ **Creation of 3D sound and its application :** 3D sound reproduction. Audio-Visual presentation
- ◆ **Development of prediction methods :** Wave-based numerical analysis and its application
- ◆ **Environmental noise :** Road traffic, railway and aircraft noises, Wind Turbine Noise, Equipment Noise
- ◆ **Room acoustic design :** Acoustical design of Auditoria, public and living spaces

### Creation of Noise Map



**Estimation of noise source strength**

Length of period  
 Small sized vehicle  
 Large sized vehicle

**Estimation of noise propagation into building area**

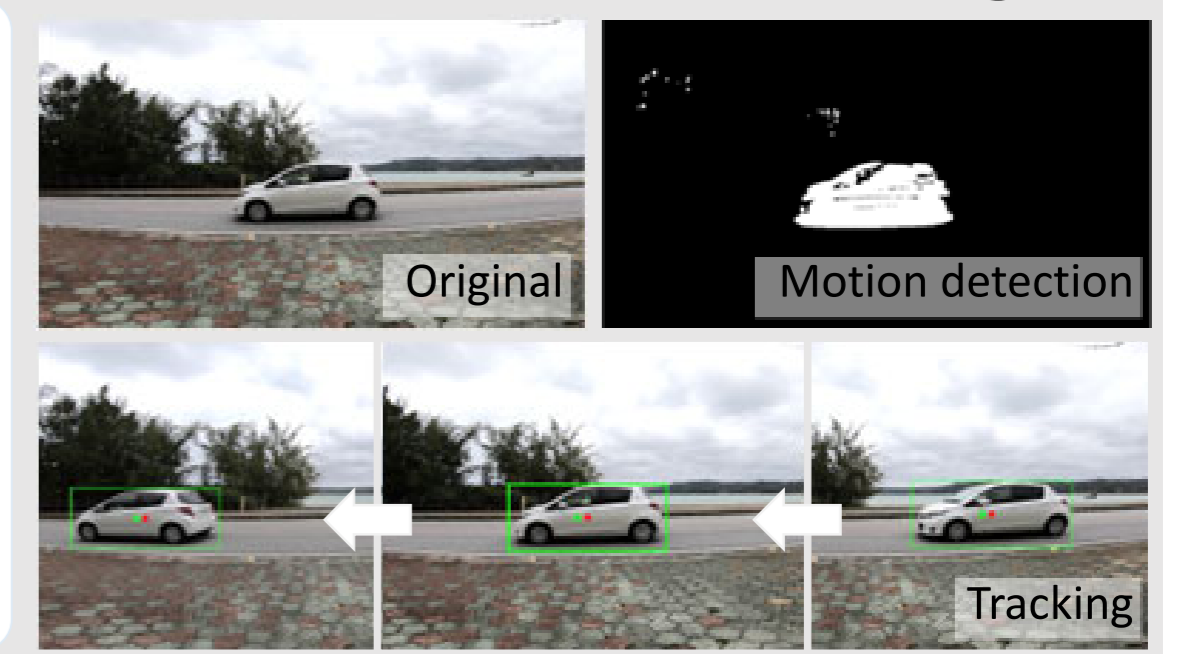
Accurate and efficient methods for creating environmental noise maps that are effective for environmental management are examined for noise source strength and noise propagation in build-up area. For source model, we propose a usage of aerial photographs and machine learning.

### Road traffic noise modeling

**Development of automatic data processing**

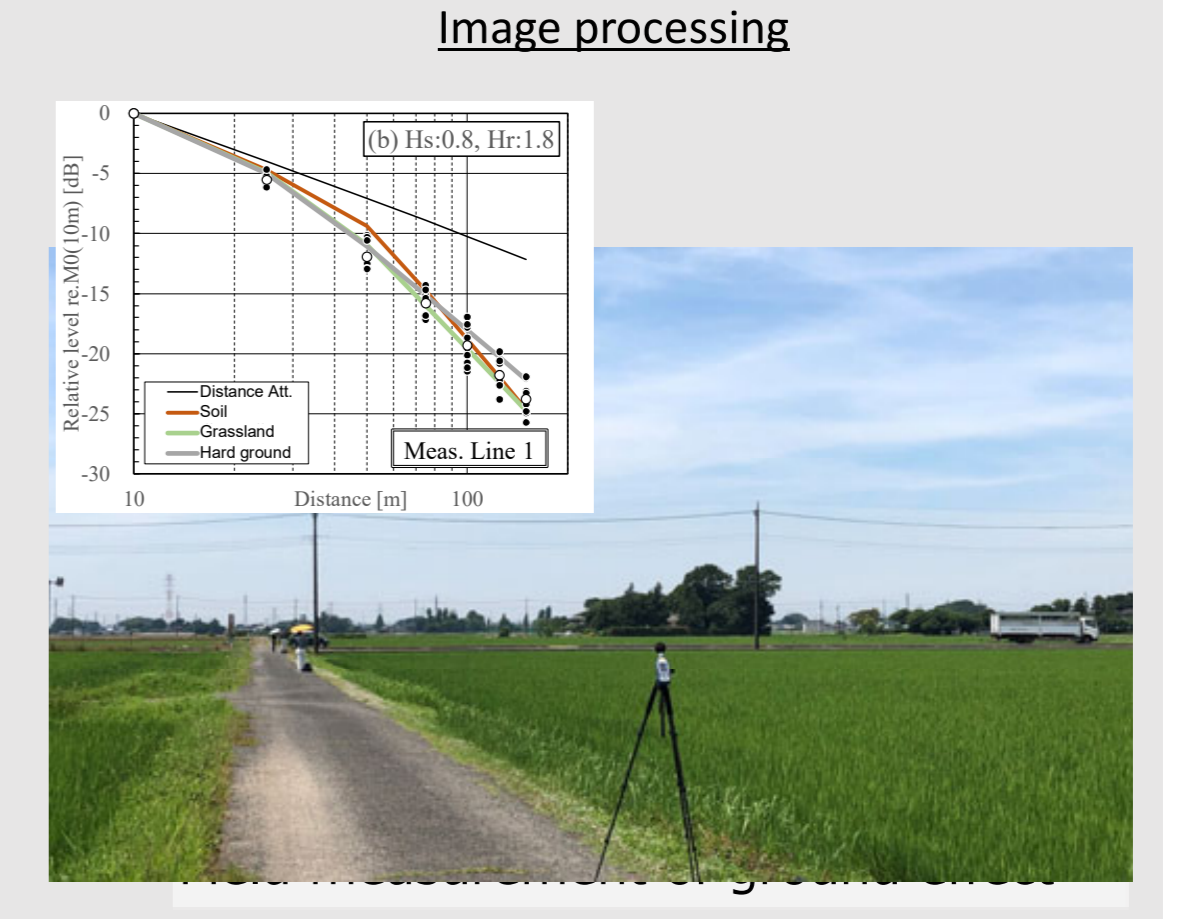
Measurement: Video camera, Sound level meter

Auto processing: Event detection, Running speed, Vehicle type classification, Sound power level

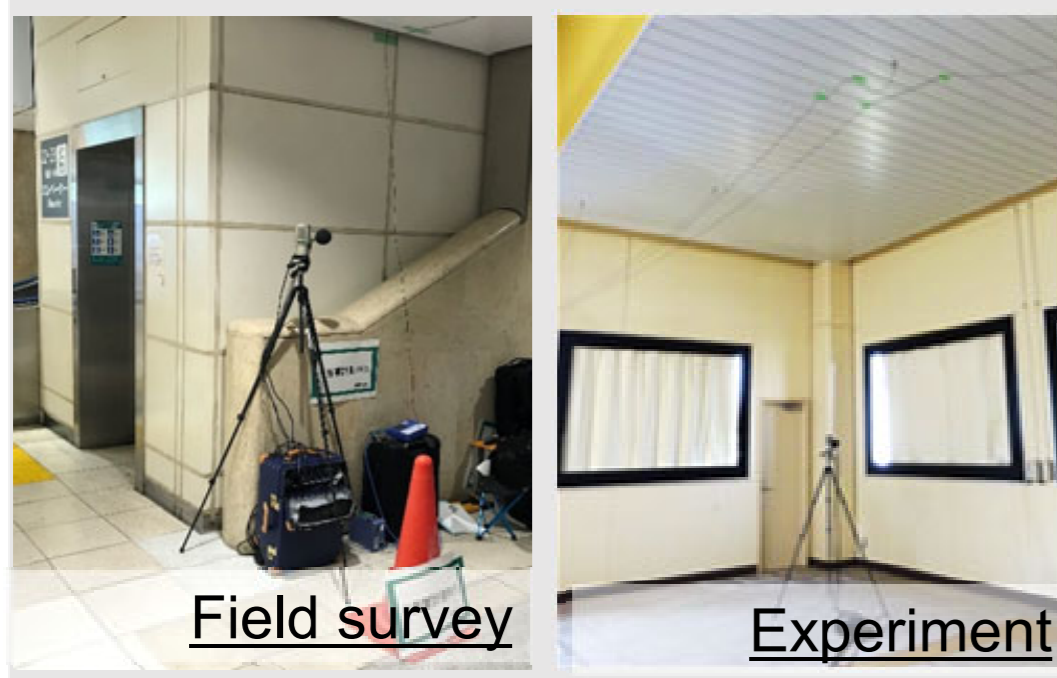


**Image processing**

Our laboratory contributes to developing Japanese road traffic noise prediction model. This research includes development of an automatic measurement system of sound power levels and elucidation of noise propagating factors such as ground effects.

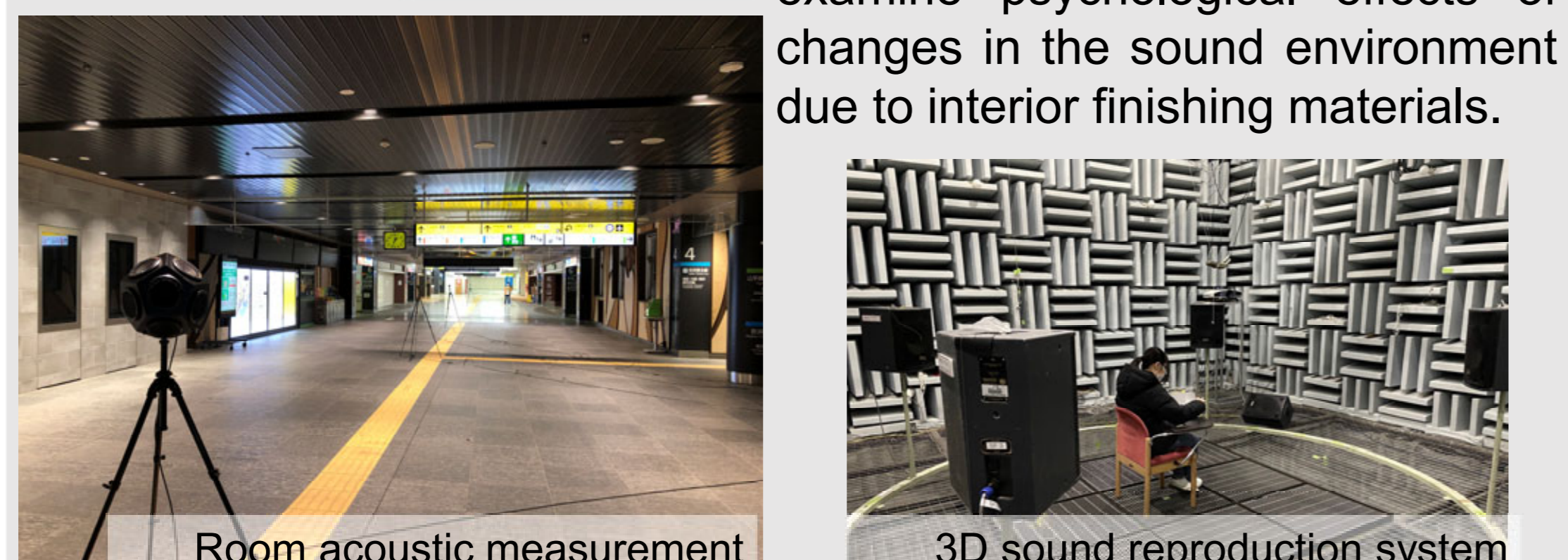


### Subjective evaluation of environmental sound of railway station



**Field survey**      **Experiment**

The sound environment of railway stations is composed of various sounds, such as environmental noises, crowds of people, announcements and sounds of passing trains. Auditory tests are conducted to examine psychological effects of changes in the sound environment due to interior finishing materials.




**Room acoustic measurement**      **3D sound reproduction system**

### Audio-visual interaction for environment evaluation

3D sound field reproduction system using 6-channel loudspeakers has been constructed in anechoic room. Audio-visual interaction on evaluation of environment is also investigated using combination system of the multi-channel loudspeakers and dome projector.

Effects of visual stimuli on subjective evaluation of sounds were studied under various sound sources and listening situations.



**Audio-Visual reproduction system**

