



TOHOKU  
UNIVERSITY



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***Utilizing of driving simulator  
for the earthquake disaster  
reconstruction***

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# Background

- In the Higashi-Nippon Earthquake disaster, tsunami struck the car of traffic jam.
- Train or airplane has professional drivers who will induce us.
- The car does not have a leader that will induce.



**Evacuation procedure by the car has not been established**



# Purpose & Approach

## Establishment of evacuation training method of the car



# Driving Simulator's Spec

What driving simulator does is

To reproduce real vehicle motions with real car cabin on motion device of 6 axes (X: front/back, Y: right/left, Z: up/down; roll, pitch, yaw)

	X	Y	Z	Roll	Pitch	Yaw
Operation range	-200mm~ +180mm	-190mm~ +190mm	-190mm~ +230mm	-12deg~ +12deg	-12deg~ +11deg	-11deg~ +11deg
MAX velocity	300mm/s	300mm/s	300mm/s	20deg/s	20deg/s	20deg/s
MAX acceleration	4.9m/s <sup>2</sup>	4.9m/s <sup>2</sup>	4.9m/s <sup>2</sup>	-	-	-

# Driving Simulator

## To preliminarily evaluate infrastructure

Construction of virtual space in various infrastructures makes it easy to find layout of panels and signs for better recognition from drivers and analyze frequent accident zones as well as to verify effectiveness of evacuation guide paths toward restoration.

## To evaluates driver's response

Driving simulator is useful for experiments which would be dangerous otherwise. Drivers' response to hazardous events can be evaluated through drive actions and biological signals.

## To evaluates vehicle characteristics

CarSim, vehicle motion analyzing simulator, incorporated for vehicle control. This enables evaluation with desired functions such as automatic driving, brake assist, camera-based environment sensing as well as evaluation of cabin layout with real scale body.



Can reproduce the shaking of the earthquake

## To evaluates simulator

Vehicle on the simulator can be replaced with different ones. This enables simulator evaluation for better reality of driving operation and visible images.



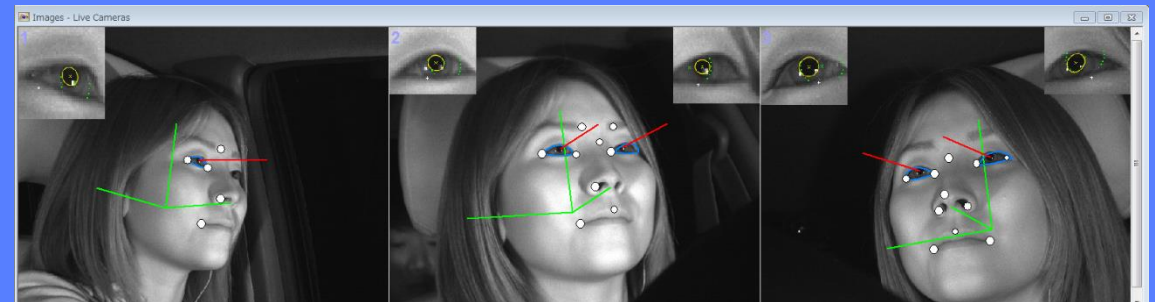
# Example of utilization, Part 1

- Validation of the traffic signal for an in-vehicle 1



At the earthquake, traffic signals would not be lighting

To avoid confusion, established an in-vehicle traffic signals.(Head-Up Display:HUD)



The line-of-sight measurement by Smart Eye systems

# Example of utilization, Part 2

- Validation of the traffic signal for an in-vehicle 2

Direction of the hill is congested



Direction of the sea (opposite direction) is not congested

Want to be able to drive temporarily opposite lane

↓  
Road capacity is doubled

Understand the location of each vehicle by using a GPS





# Proposal of evacuation training by vehicle

Plan of evacuation procedures that made use of the experiences of the earthquake

validation



Select the effective plan



Evolverment to the quake-prone area

training



Lead to disaster mitigation

using a simple simulator or other simulators

**Thanks for your kind attention !**

