

ASSESSMENT OF SAFETY AND AIS COMMUNICATION AROUND SHANGHAI PORT AREA


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Background

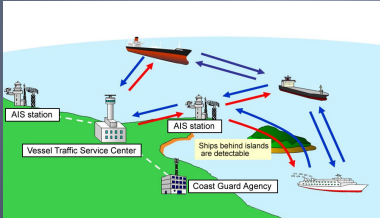
- Safety assessment of navigation is quite important, especially in congested waterways.



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Background


- Recently AIS is a key infrastructure to improve the safety.



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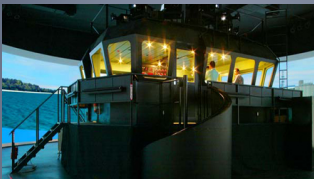
Background

- Marine Traffic Simulator and AIS Simulator are developed for these purpose in Osaka University.



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How to evaluate marine safety?

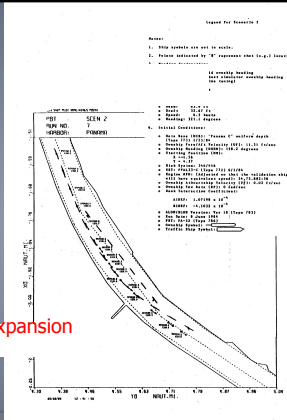


Ship handling simulator

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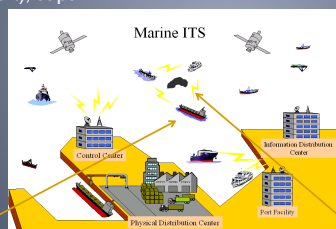
Safety Assessment by Ship Handling Simulator

Panama Canal Gaillard Cut expansion project
CAORF, 1984



Marine ITS Project

- The author has engaged in *Marine ITS* project (FY1999-2004) sponsored by Ministry of Transport (now changed its name as of Land, Infrastructure and Transport), Japan.



Marine Traffic Simulator

AIS Simulator

Marine Traffic Simulator (1)

- Marine Traffic Simulator is a simulation system to reproduce the marine traffic of a given area as natural as possible.
- The system consists of ship generation subsystem, ship navigations subsystem, automatic collision avoidance subsystem and system interface and logging subsystem.

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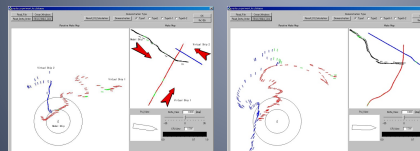
Marine Traffic Simulator (2)

- Ship generation subsystem generates ships from given departing points according to the statistical data, including their attributes such as ship type, length, speed, manoeuvring characteristics, waypoints etc.

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Marine Traffic Simulator (3)

- Automatic collision avoidance subsystem is more heuristic human model which can take appropriate navigational decision for collision avoidance.



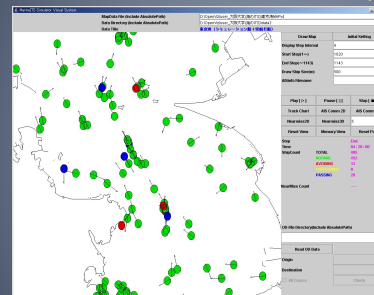
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Marine Traffic Simulator (4)

- System interface and logging subsystem is I/O user interface including graphical animation and data logger of the simulation to be used for the assessment.

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Marine Traffic Simulator (5)

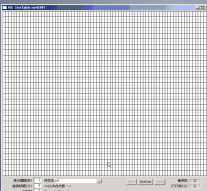


Tokyo Bay

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AIS Simulator (1)

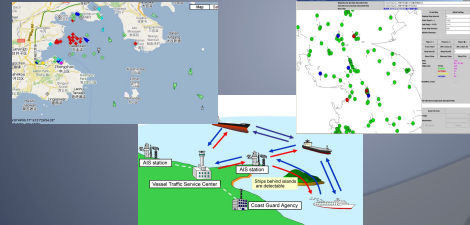
- AIS Simulator is a system to simulate real-time AIS slot map of any ship in the gaming area, if all ship positions and status of navigation are given.



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AIS Simulator (2)

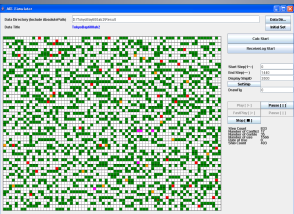
- Data can be provided either by AIS receiver/VTS or Marine Traffic Simulator.



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AIS Simulator (3)


- Slot conflicts and garbles due to radio communication can be analysed using this simulator.



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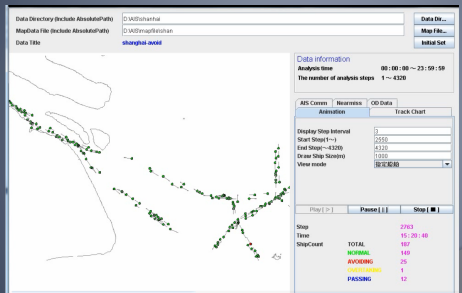
Purpose

- The authors have applied these simulators to Shanghai port area, one of the most congested waterways in the world to assess its safety or AIS communication conflicts and garbles.



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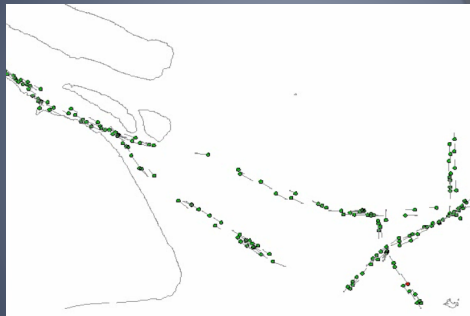
Simulation Result



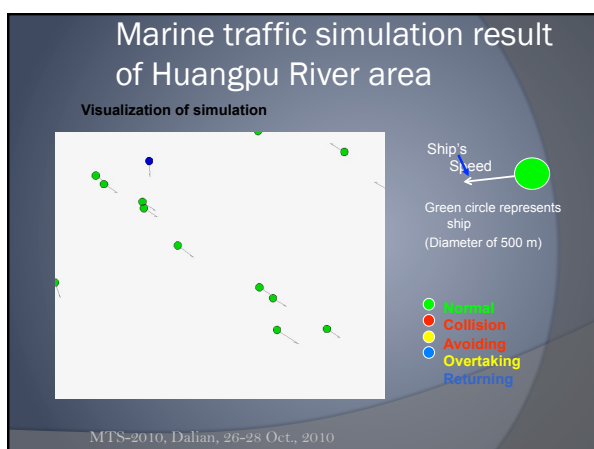
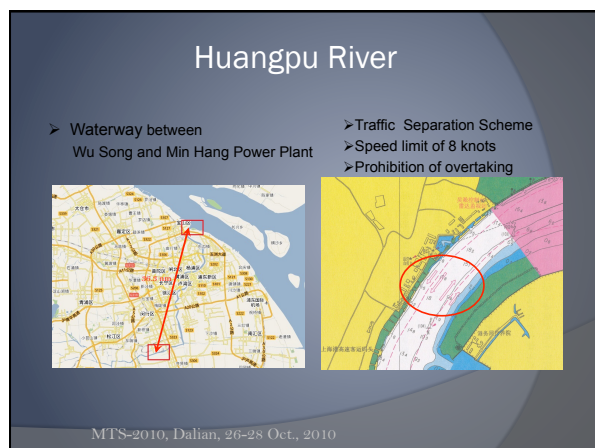
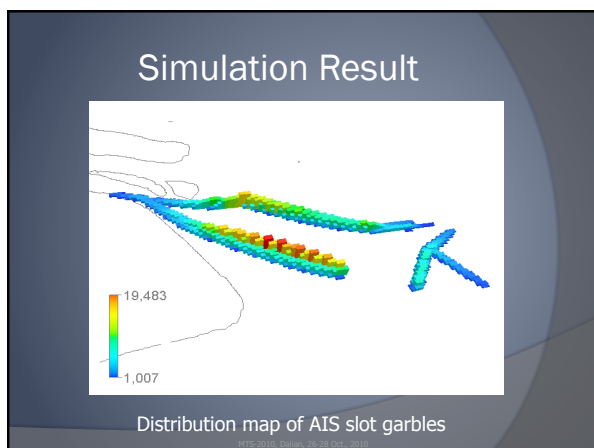
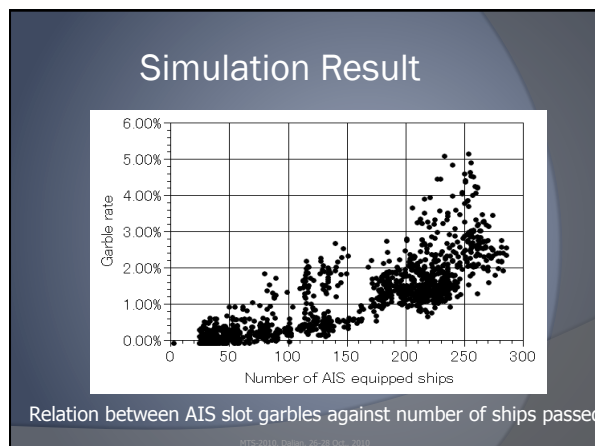
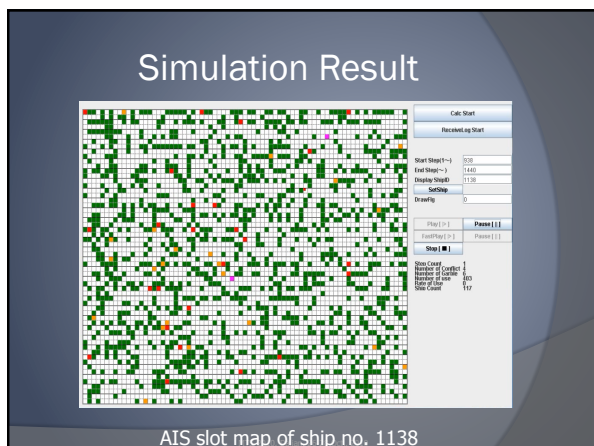
Step	Time	TOTAL	AVOIDING	COLLISION	PASSING
1	15:20:48	157	148	25	1
2					1.2

Marine traffic simulation of Shanghai port area
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Simulation Result



Ship No. 1138 (red mark in lower right side)



Conclusions

- Marine Traffic Simulator and AIS Simulator are briefly introduced.
- They are applied for Shanghai Port area and Huangpu River in Shanghai.
- They are good tools to evaluate safety of congested waterways or port area in qualitatively and quantitatively.

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