

Article Analysis

A Robot Application for Marine Vessel Inspection

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INTRODUCTION



Figure: Traditional Inspection Methods

- Overview:
Traditional Inspection
MINOAS
Spatial Content Management System (SCMS)

REENGINEERED INSPECTION PROCEDURE

System	Stage 1	Stage 2	Stage 3
Aerial platform		x	
Lightweight inspection system (crawler & localization device)			x
Heavyweight inspection system (crawler & NDT thickness measurement device)			x
Defect detection system	x		x
Spatial contents management system	x	x	x

Figure: Relation Between Systems and Inspection Stages

MINOAS Inspector Platforms

Laser Scan
IMU
SLAM
Infrared or Ultrasound sensor

MINOAS Inspector Platforms

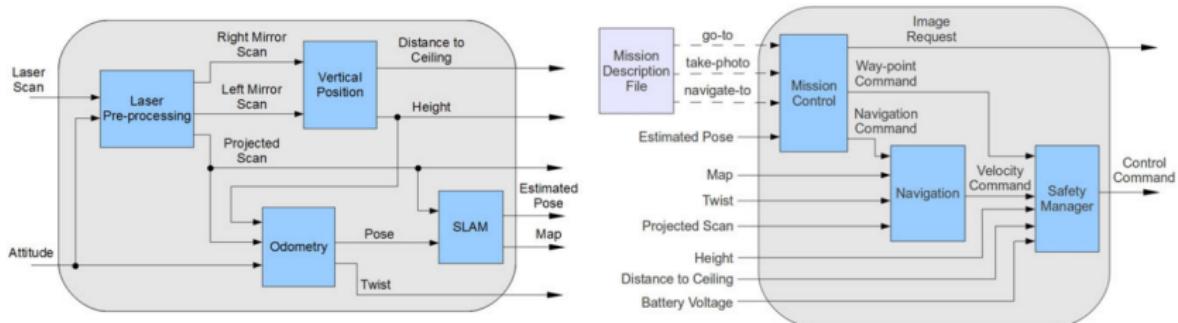
Laser Scan
IMU
SLAM
Infrared or Ultrasound sensor



Figure: Aerial Vehicle

Aerial Inspection Robot

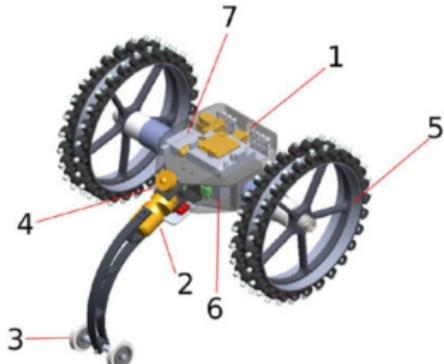
Aerial Inspection Robot For Stage 1



Self-Localization, Mapping and Mission Execution Modules

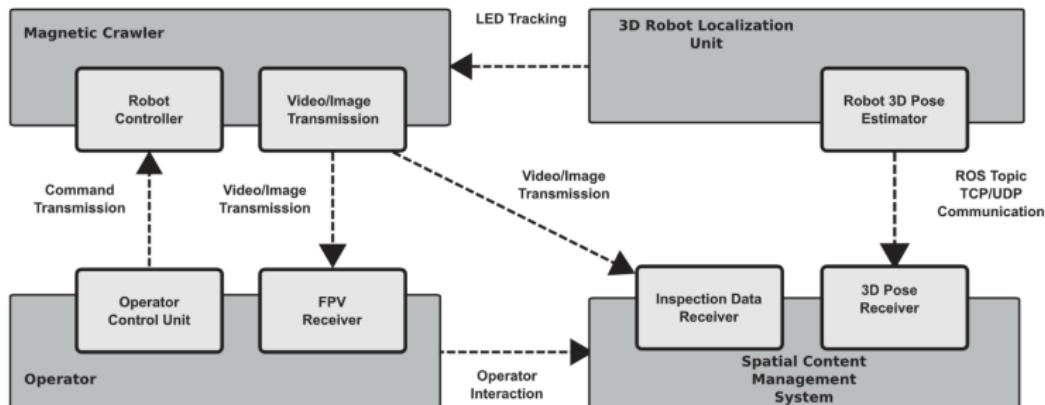
Lightweight Inspection Robot

Lightweight Inspection Robot For Stage 2



Lightweight Inspection Robot

Lightweight Inspection Robot For Stage 2



Control Software of the Lightweight System

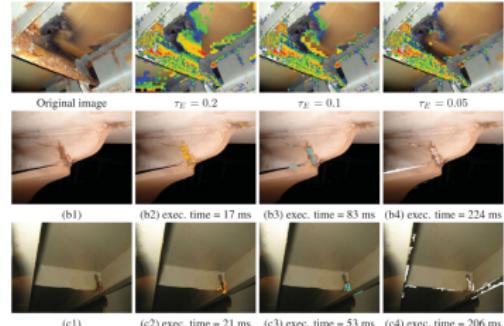
Heavyweight Inspection Robot



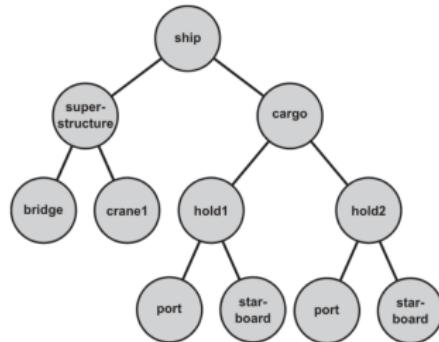
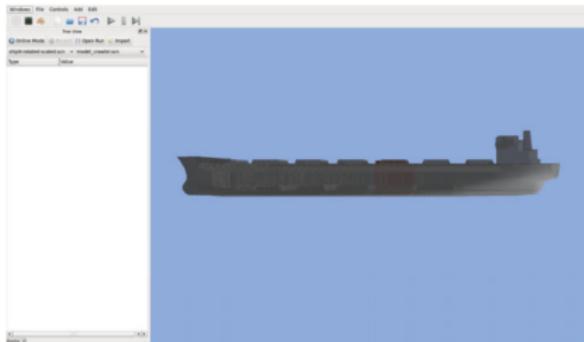
MARC Rear Wheel Configurations

A Vision-Based Solution for Defect Detection

- Corrosion Detection;
Roughness is measured
- Color information
- Crack Detection;
- $N \times N$ pixel
- $M \times M$ pixel



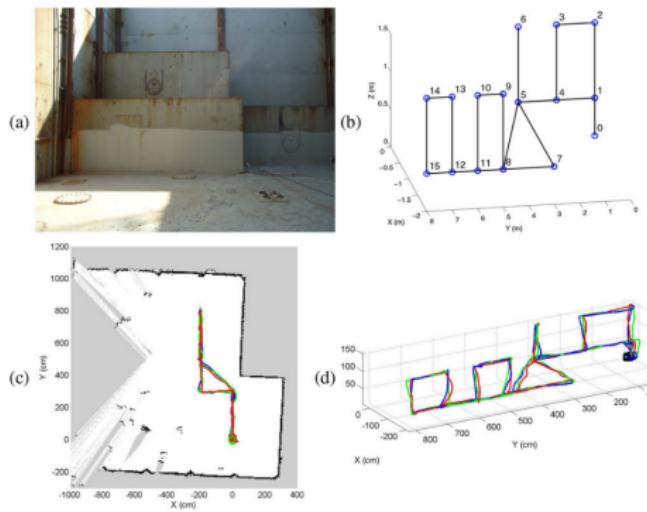
Spatial Content Management System for Robot-Acquired Inspection Data



- SCMS Data;
Collecting
Sharing
Displaying

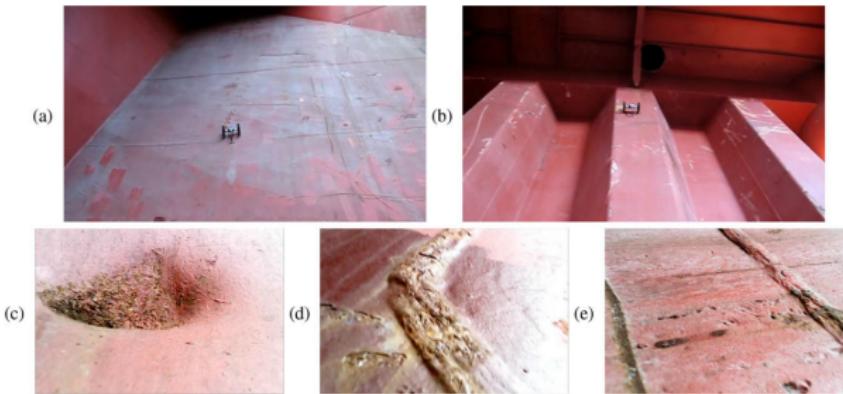
System Performance Evaluation

Micro-aerial vehicle (MAV)



System Performance Evaluation

Lightweight Crawler



System Performance Evaluation

Heavyweight



Conclusion and Future Research

Vessel inspection

Different locomotion capabilities

Auxiliary systems

Field trials

SCMS

Conclusion and Future Research

Thanks