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Years Of Excellence

The International Maritime Transport
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"MARLOG 12"

Sustainable & Innovative
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Towards a Resilient Future

12 - 14 March, 2023 Alexandria - EGYPT

2023

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Cezar Scarlat
Alexandra Ioanid
Nistor Andrei

USE OF THE GEOSPATIAL TECHNOLOGIES AND ITS IMPLICATIONS IN THE MARITIME TRANSPORT AND LOGISTICS

Paper structure. Introduction

Research objective and research questions

Literature review

Proposed solution

Managerial implications

Conclusions and future research

Objective:

investigate the impact of digitalization on shipping industry

focus on the role of geospatial technologies in this process

Questions:

what are the geospatial technologies suitable to be implemented in a fully autonomous system for cargo ships operations?

how can these technologies be implemented?

The Maritime Safety Committee framework:

Degree one:
Ship with automated processes and decision support
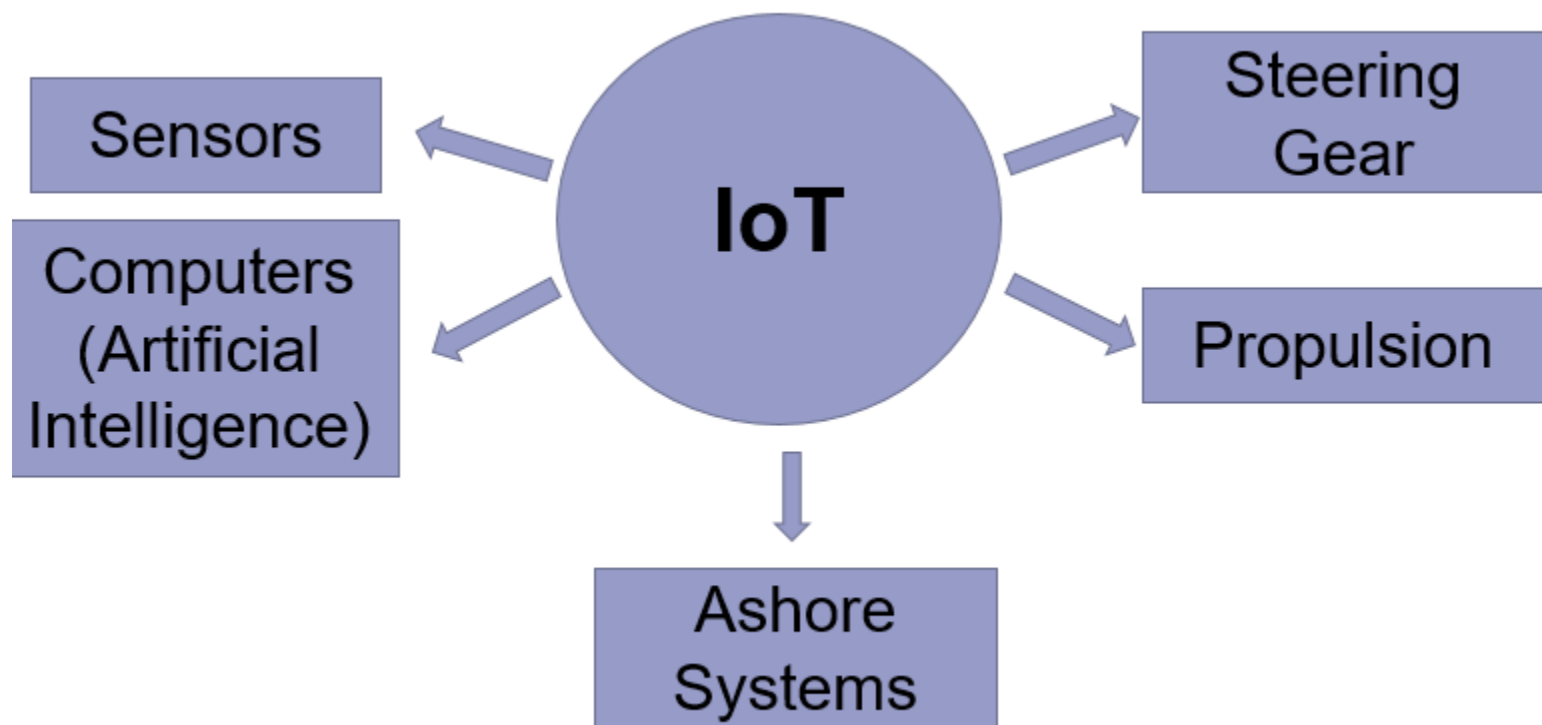**Degree two:**
Remotely controlled ship with seafarers on board
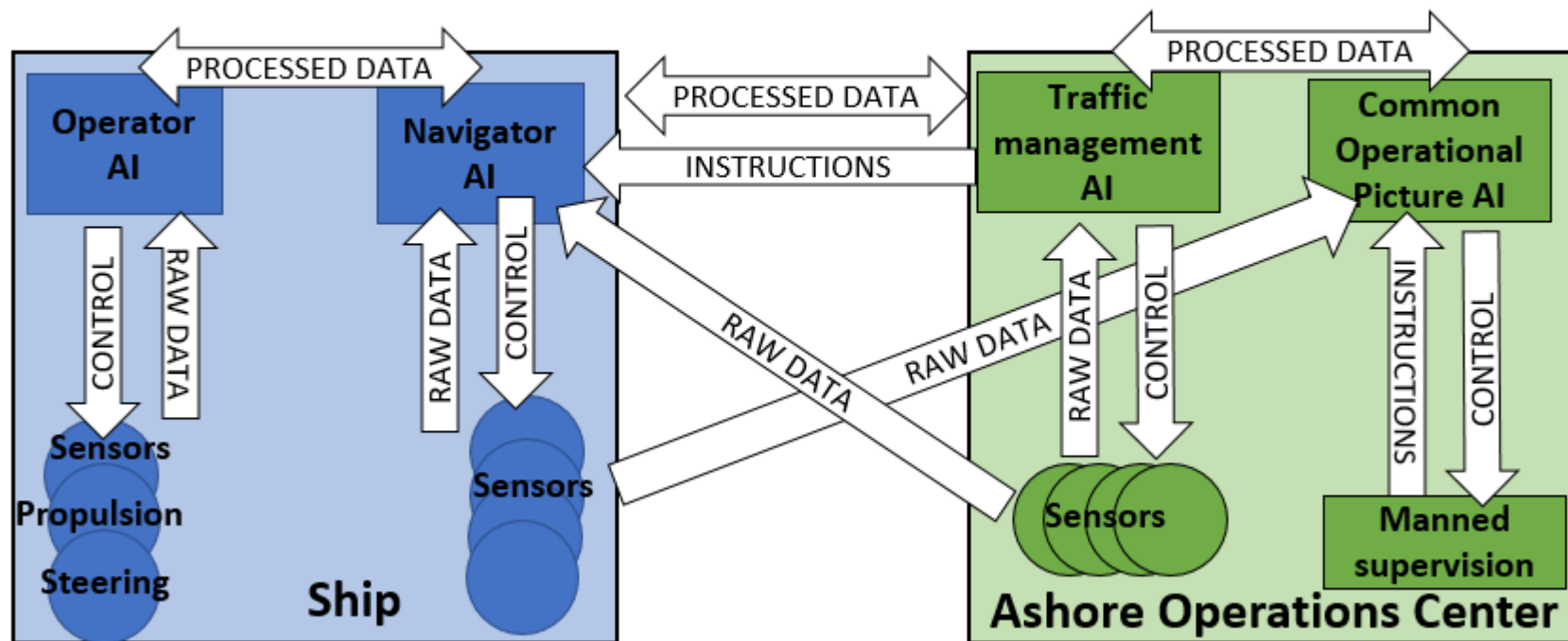**Degree three:**
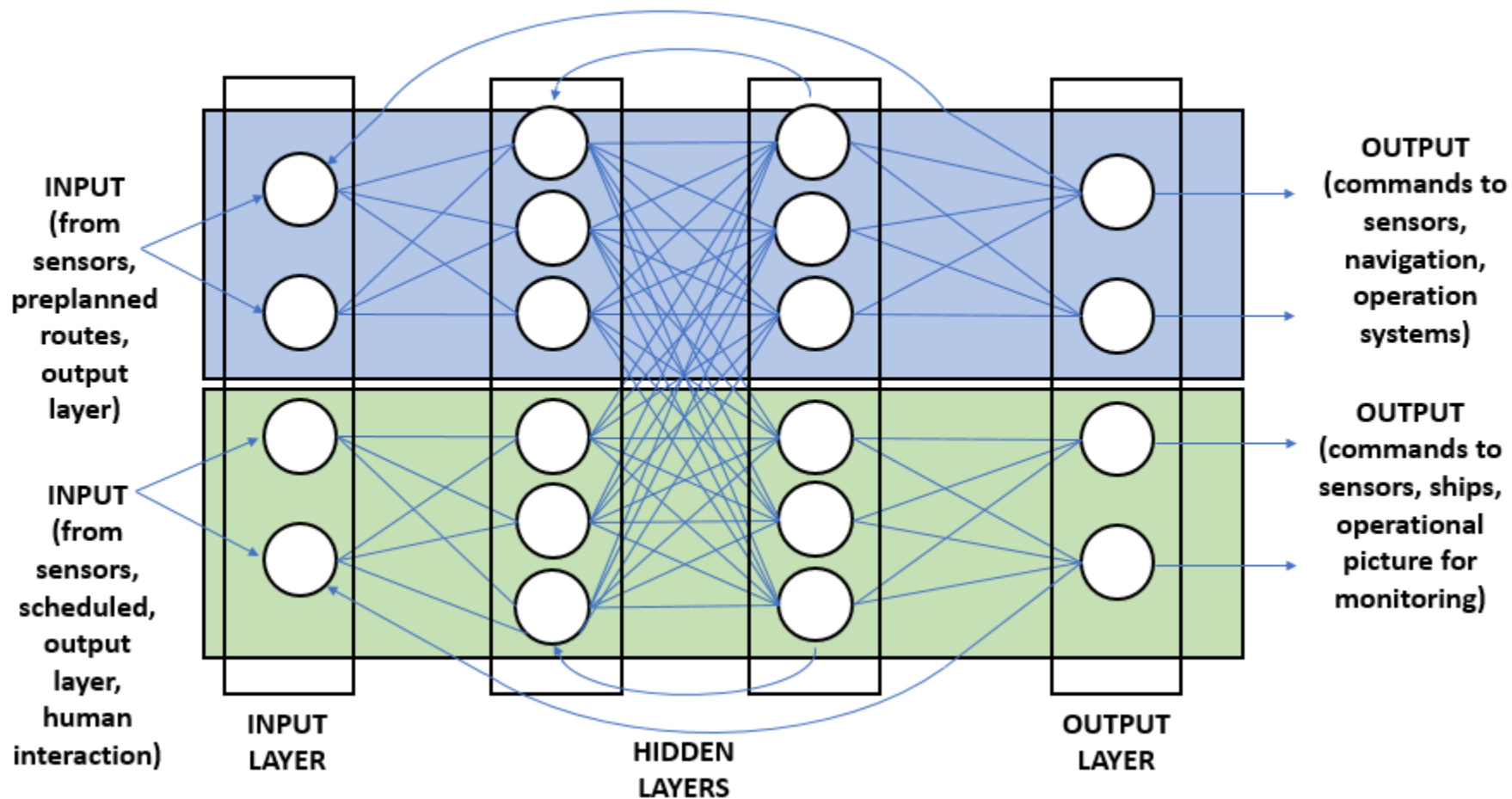**Remotely controlled ship without seafarers on board**
Degree four:
Fully autonomous ship

PROPOSED SOLUTION TO OBTAIN FULL AUTONOMY

PROPOSED SOLUTION TO OBTAIN FULL AUTONOMY

INPUT (from sensors, preplanned routes, output layer)

INPUT (from sensors, scheduled, output layer, human interaction)

OUTPUT (commands to sensors, navigation, operation systems)

OUTPUT (commands to sensors, ships, operational picture for monitoring)

INPUT LAYER

HIDDEN LAYERS

OUTPUT LAYER

WORKING SCENARIOS FOR THE PROPOSED SOLUTION

Manned ship/Manned port	Manned Ship/Automated port	ASV/ Manned port	ASV/AOC
Non automated traffic	Automated routing, manually navigated by ship	Autonomous ship in independent mode	Fully automate system
Manual actions mandatory on both sides	Ship manned work required	Port manned work required	Supervision may be emplaced
Current state	Interim	Interim	Final state

→ Cyber threat increases

The proposed system has the potential to:

- Implement dynamic cooperation
- Provide reliable control of ASV
- Provide clear picture of marine traffic

Potential benefits of an autonomous maritime traffic management system:

- Increased eficiency
- Improved safety
- Reduced costs
- Lower environmental impact

The novelty of the study:

- The proposed architecture
- The proposed model for ANNs
- The use of FPGA as hardware support

Possible approach for future research:

- Building a model in Python with TensorFlow
- Simulation in Python/MATLAB
- Optimization to be used on FPGA
- Implementation

Thank You