NAVIGATIONAL DECISION SUPPORT SYSTEM FOR SEA-GOING SHIPS

NAVDEC

SOFTWARE developed by Sup4Nav LLC, spin out company of Maritime University of Szczecin
At present there are no requirements obliging sea-going vessels to be equipped with a decision support system that would assist navigators in collision situations.

Consequently, vessels do not carry such systems.

**Human error causes 80% of collisions at sea.**

**Example:** COLLISION BETWEEN M/V GOTLAND CAROLINA AND M/V CONTI HARMONY

**BOTH NAVIGATORS THOUGHT THAT THEY WERE STAND-ON VESSELS !!!**
At present the systems used on ships are information systems only.

Example: ECDIS
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Sources of Input Data:

- log
- gyro
- ARPA
- GNSS1
- GNSS2
- GNSS...
- AIS
- ENC
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Example of implementation (1)

NEW Functionality:
Recommended New Course or New Speed as well as a Sector of Safe Courses

NEW SPEED
11.0 kn

NEW COURSE
193.6°

Standard navigational data

NEW Functionality:
Presentation of our Status according to the COLREGs
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Example of implementation (2)

Standard navigational data

NEW Functionality: Presentation of our Status according to the COLREGs

NEW Functionality: Recommended New Course as well as a Sector of Safe Courses
Example of implementation (3)

NEW Functionality:
Solution Computed for MORE than one Vessel

[Diagram of navigational decision support system]

- CPA Limit: 1.0 Nm
- CPA Calc.: 1.00 Nm
- TCPA Limit: 10 min

NEW COURSE 070.8°

- HDG 353°
- COG 353.7°
- SOG 11.0 kn
- ROT 0°/min
- 53°57.81'N
  014°16.09'E

Target Data:
- MMSI: 261187050
- CALL SIGN: BBBB
- STATEK 2

Parameters:
- ANTI_COLLISION
- BRG/RNG: 054.3° / 17.1 Nm
- CRS/SPD: 240.1° / 29.6 kn
- CPA/TCPA: 1.4 Nm / 12.07
- BDR/TBDR: 2.4 Nm / 15.28
- ROT:
- STAGE: 2
- STATUS: 0

Crossing situation: Our vessel is give way vessel.
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Example of implementation (4)

NEW Functionality:
Solution computed for MORE than one vessel
Example of implementation (5)

SAFE SITUATION after Manouvre
NEW Functionality (optional): Data fusion

The System:

- calculates encounter parameters more accurately due to:
  - taking into account the size of the vessel,
  - applying fusion algorithms of more than one GPS / DGPS receivers for position plotting,
Presentation of our Status according to the COLREGs

SYSTEM ADVANTAGES

The System:

- takes into account COLREGs, both for good and restricted visibility,
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SYSTEM ADVANTAGES

The System:

• resolves navigational situation computed for more than one vessel,
The System:

- takes the vessel’s size into account when planning an anticollision manoeuvre,
SYSTEM ADVANTAGES

The System:

- immediately notifies the operator about target manoeuvre thanks to information about the target’s ROT,

flashing yellow symbol marks manoeuvring target
The System:

- calculates new courses and speeds of own ship, which permit the passing of other targets at assumed CPA, which is preset by the master in advance

**CPA Limit** – set up by master

**CPA Calc** – CPA used for computation

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**SYSTEM ADVANTAGES**

**NAVDEC** CPA Limit – set up by master

**CPA Calc** – CPA used for computation

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**NEW COURSE**

070.8°

**TARGET DATA**

- **MMSI**: 261187060
- **CALL SIGN**: BBBB
- **STATEK**: 2

**PARAMETERS**

- **BRC/RNG**: 054.3° / 17.1 Nm
- **CRS/SPD**: 240.1° / 12.86 kn
- **CPA/TCPA**: 1.4 Nm / 12.07
- **SOG/TBOP**: 2.4 Nm / 15:28
- **ROT**: 0°/min

**STATUS**: 0

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Crossing situation Our vessel is give way vessel
The System:

- works out a manoeuvre also in relation to vessels, which are in the radar shadow,

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SYSTEM ADVANTAGES

Ship A detects ship B by radar and AIS, but ship C only by AIS.

Ship B detects ship A by radar and AIS, but ship C only by AIS.

Ship C detects ship B and A by AIS. B and A are not visible for the radar.
SYSTEM ADVANTAGES

The System:

- the module of decision support system can be connected to any presently working systems.
... follows current advancements of marine navigation, including e-navigation and e-Maritime

• e-navigation (2005, IMO) – a concept of wider use of ICT in maritime navigation, developed in the IMO forum;

e-Maritime (2001, EU)
(European Commission : Strategic goals and recommendations for the EU’s maritime transport policy until 2018)

Intelligent navigational advisory systems, with their information and decision support functions, will constitute an element of e-navigation and e-Maritime
• NAVDEC exclusive worldwide licence
• NAVDEC exclusive licence for patent PCT/PL2010/000112, 08.11.2010
• Registered trade mark
AWARDS

• Sup4Nav has been distinguished by Szczecin's President as an Innovation of the Year in the Business Awards – Business Compass 2013 competition.
• NAVDEC made it to the final seven of the programme "Polish Invention of the Year 2014" co-organized by the Ministry of Science and Higher Education and Polish TV.
• Sup4Nav has taken 2nd place (Polish regional competition) in EUROPEAN SATELLITE NAVIGATION COMPETITION 2014 and was 2nd in European University Challenge.
• Sup4Nav has been distinguished by Newsweek Polska and PwC in category StartUp of the Year 2015.
• Diamond Matrix 2015 in the category Innovation R & D, organized by the West Pomeranian Business School.