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Local Communities

Institute of
Marine Engineering,
Science & Technology

IMAREST

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IMarEST BeNeLux Branch

Committee	Douwe Stapersma (Chairman)	Peter de Vos (Secretary)
	Roely Ruissen (Treasurer)	Arthur Vrijdag (Web-coördinator)
	Rinze Geertsma	Arie de Groot
	Tjeerd Heeringa	John Riordan
	Kees van Roosmalen	Joris Rusman (early-career representative)

Annual General Meeting (AGM)
Mini-symposium: Autonomous ships

Speakers: Robert Hekkenberg (TUD), Egbert Ypma (MARIN), Peter van der Klugt (PK Marine) and Erik Theunissen (NLDA)
Date: Friday 17th of November 2017
Time: 13:30 – late
Venue: Delft University of Technology – 3ME Faculty – lecture room A
Mekelweg 2
2628 CD Delft
Contact: imarestbenelux@gmail.com
Parking: P-Aula or P-3ME; see campus map on http://www.tudelft.nl/en/contact/.

Dear member or friend,

You are hereby cordially invited to the coming Mini-Symposium and Annual General Meeting (members only) of the IMarEST BeNeLux Branch. **Please inform me if you are planning to attend this event by filling in the online form; advance registration is required.**

Details of the programme and additional information can be found below.

Your attendance would be much appreciated. The mini-symposium is open to all who are interested, the AGM can only be attended by members of the IMarEST.

After the AGM a dinner is organised for those interested. Dinner at the restaurant will be subsidised by means of a small financial contribution of the BeNeLux branch, however a personal contribution to the dinner costs will be required from each participant. The exact amount per participant that the branch will pay will be announced on the day.
Please let me know whether you will join the dinner in the online form as well, so we can make an accurate reservation at the restaurant.

Please register online before the 10th of November. Thank you in advance.

Yours sincerely,
P. de Vos CEng CMarEng MIMarEST – Honorary Secretary Benelux Branch.

[see next page]

Programme

13.30 - 13.45 Arrival and coffee
13.45 - 14.30 TUD, MARIN
14.30 - 14.45 Discussion
14.45 - 15.00 Break
15.00 - 15.30 NLDA
15.30 - 16.00 PK Marine
16.00 - 16.15 Discussion and closure of Mini-symposium

16.45 – 18.00 Annual General Meeting (AGM) IMarEST Benelux branch **(for members only)** - Agenda given below
18:15 Leave for restaurant
18.30 Annual Dinner at "Moeke Delft", Beestenmarkt 16, http://moekedelft.nl

Agenda for AGM (for members only)

1. Opening
2. Announcements
3. Minutes of Last AGM
4. Annual Report of this year's activities
5. The Financial Account for the year up to 1 October 2017
6. Auditors Statement
7. Appointment of Auditors for the year up to 1 October 2018
8. Update on Professional Recognition (e.g. CEng) in the Netherlands
9. Announcement of winner of Branch Certificate for the best presentation made to our branch over the past year
10. Election of committee members
    a. Honorary Secretary P. de Vos and Honorary Treasurer R. Ruissen retire (each year). R. Ruissen is available for immediate re-election and appointment as Honorary Treasurer.
    b. Committee members A. Vrijdag, J. Riordan and T. Heeringa retire (every other year)
    c. (Re-)Election of committee members – available and eligible for (re-)election are A. Vrijdag, J. Riordan, T. Heeringa, M. van Leeuwen, E.J. Boonen, L. Huygens and C. Goldsworthy.
    d. Appointment of Honorary Secretary
11. Technical Programme 2018 – Programme will be announced
12. Any other business
13. Closure

Abstracts

TUD and MARIN

In the first part of this presentation an overview of the developments in the field of autonomous shipping is given. The reasons for wanting to sail without personnel are discussed, as well as challenges that are unique for the maritime environment in comparison with the automotive and aerospace domain. Furthermore some of the "hidden challenges" are uncovered: what other tasks than "navigating" are performed by a crew? After this, a vision on the future of autonomous shipping is given: what ship types are most likely candidates for "autonomisation"? Will we move towards fully autonomous vessels or partly autonomous vessels? Will there be a role for shore control stations? Finally a short introduction of ongoing research projects related to autonomous ships is given.

The second part of this presentation is given by MARIN and is titled:" The need for a nautical simulation platform for evaluation of Detect And Avoid systems in the nautical domain." Similar to the aerospace and automotive domain, in the nautical domain there is a trend towards increased automation and integration of navigation functions, providing the basis for an automated navigation capability. With the appropriate delegation of execution authority to the system, such a capability will yield an increase in navigation function autonomy. For the design of such a system many questions need to be answered concerning the required performance and behavior. The NLDA speaker will highlight some of these questions within the aerospace context. In this presentation more focus is given on the nautical context, which is less regulated and more restricted in its operating environment. The physical manoeuvring space, the manoeuvring capabilities and the traffic intensity and diversity differ considerable and each is affecting and complicating the required safety assessment and development process.

Based upon the work by Netherlands Defence Academy (NLDA) in the avionics domain, the lessons learned during the development of D(etect) A(nd) A(void) concepts will be refined, applied, and adapted to the nautical domain. In preparation nautical scenarios are developed which reflect the wide variety and complexity of traffic and sailing scenarios which can be encountered and need to be handled safely. Together with NLDA it is being investigated how, using an analysis of encounters, quantified separation and alerting thresholds for the DAA functions can be specified to model these encounters and their solution. A separate solution algorithm is developed and tested in a simulation and model environment. Obviously the involvement of ship and environment specific manoeuvring capabilities are essential.

The presentation will provide an overview of the overall approach and rationale for the testbed simulation system set-up which will provide for future assessment of DAA systems and human interaction. In addition, related and relevant MARIN research projects will be briefly presented.

Prof Theunissen (NLDA): Automating Navigation: The need for a performance and risk-based approach

Similar to the aerospace and automotive domain, in the nautical domain there is a trend towards increased automation and integration of navigation functions, providing the basis for an adaptive automated navigation capability. With the appropriate delegation of execution authority to the system, such a capability will yield an increase in navigation function autonomy. For the design of such a system this raises questions regarding the required performance and behaviour. When should the system be able to detect a potential conflict with another vessel? When and how should it manoeuvre? At present, no objective, quantified performance requirements exist for such a system.

These questions also existed in the aerospace domain, where according to Code of Federal Regulations pilots of Unmanned Aircraft Systems have to remain Well Clear of and avoid creating a collision hazard with other aircraft. In 2017 the Minimum Operational Performance Standards (MOPS) for UAS Detect And Avoid (DAA) systems were published. Meanwhile, phase 2 of the MOPS development has commenced. In the context of phase 2, questions concerning the automation of DAA are being addressed.

At the Netherlands Defence Academy (NLDA), lessons learned during the development of the MOPS for the aerospace domain have been and are being applied to the development of DAA concepts for the nautical domain. Together with MARIN it is being investigated how, using an analysis of encounters, quantified separation and alerting thresholds for DAA functions can be specified.

The presentation will provide an overview of the approach and rationale that has been applied in the aerospace domain for the definition of the display, guidance and alerting requirements for airborne DAA systems. Following this, suggestions and examples for the nautical domain will be provided.

Peter van der Klugt (PK Marine)

The world-wide interest and successes, on applying robotic technologies to realise unmanned aircraft and self-driving cars encourages many to apply similar technologies for surface and underwater vessels. Unfortunately, the maritime market is not a volume market, has technology-wise always lagged behind those other markets due to the lower innovation budgets and the smaller market size, and is characterised by its hostile (and usually inaccessible) environment. It is no wonder that the mariner had, and still has, such an important role on a vessel; more often than not he has to deal with the unexpected, usually with primitive equipment in awkward conditions, as there is no one else. In his presentation, Peter van der Klugt will argue that, before one should try to build an autonomous (unmanned) ship, one should try to build an 'Artificial mariner'. And even before that task, one should put serious effort

in improving the automation equipment on board today's ships including those considered today to be 'state of the art'.

About the speakers

Robert Hekkenberg (1979) is an associate professor at TU Delft, specializing in ship design. He has been involved in a number of national and international projects related to the design and production of ships and has written a PhD thesis on the optimization of the dimensions of inland ships. Since 2015, Robert's research has been increasingly directed towards autonomous ships. He has played a major role in the development of several research proposals on this topic and he is now involved in a Dutch national Joint Industry Project and an EU-funded Horizon 2020 project that strive to enable (partially) autonomous shipping. Robert currently supervises three PhD candidates that are developing concepts for autonomous ships and ship systems. Apart from doing research, Robert is actively involved in the educational programme of Marine Technology. He is the director of studies of the BSc programme, teaches courses and supervises students."

Egbert Ypma graduated in 1989 from Delft University of Technology (Navigation & Control). After his studies he completed his military service in the Royal Netherlands Navy before joining the research department of Heerema. There he worked on Dynamic Positioning and ballast simulation systems. After a few years of doing offshore FMEA trials for Global Maritime Ltd, he started working for Imtech Marine & Offshore, mainly on the development of integrated bridge systems and dynamic position control. In 2005 he started working at MARIN, first at the Ships department as a project manager, later at the R&D department. Today he is still working at the R&D department as a teamleader and researcher. In addition he coordinates MARIN's research program Autonomy & Control.

Prof. Theunissen has been active in the field of Avionics for over 25 years. Since 2003 he is a part-time professor in Avionics at the Netherlands Defense Academy. The company ISD, which he founded in 1988, has designed software for synthetic vision systems used in various U.S. research projects. In the context of airborne Detect and Avoid (DAA) systems he is a member of RTCA Special Committee SC-228.
With his company he has been involved in various projects focusing on the design and evaluation of DAA systems for unmanned aircraft. Since 2014, the DAA system ISD designed has been used by NASA in over 750 encounters, flying their MQ-9 Ikhana unmanned aircraft against various other intruder aircraft.
Prof. Theunissen holds an M.Sc. degree in Aerospace Engineering, an M.Sc. in Electrical Engineering and a PhD from Delft University, all three cum-laude. For his research, he has received over 20 international awards among which two times the MITRE sponsored David Lubkowski Memorial for Advancement in Digital Avionics.

Peter van der Klugt got his Ph.D. in 1987 on the subject Rudder Roll Reduction. Since then, he has been employed by Imtech Marine (now RH Marine), always at the forefront of innovation of ship control systems, integrated bridges, machinery automation etc. His designs control naval vessels, luxury yachts, offshore vessels and a variety of remote commanded, free-sailing, scale models such as (in 1983) at the Haringvliet. In 1989 he posed his ideas with respect to artificial intelligence for the first time, ideas that gradually affected the bridge systems manufactured by Imtech Marine and, recently, IEC legislation with respect to Bridge Alert Management. Last year he started PK Marine and today he is working together with a group of small companies and students to realise what he refers to as 'The Artificial Navigator'.