Dr. Rachel Jean Pawling

BMT DSL Research Fellow for Naval Design

Department of Mechanical Engineering
UCL
Torrington Place
London
WC1E 7JE

Work phone: 020 3108 9493

E-mail: r.pawling@ucl.ac.uk

Key Points

- Internationally recognised researcher in innovative ship and submarine design methods and applications
- 11 published journal papers, 2 of which have been awarded institutional medals
- 3 journal papers in preparation (drafted).
- 56 papers presented to refereed conferences (lead author on 12), including regular papers to 5 of the leading international conferences
- Organisation of three 2-day workshops with attendance from industry and academia and editing of three workshop proceedings (2013-2017)
- A range of individual and multi-disciplinary team-based work over multi-year projects
- Significant contribution to 9 major research projects (UCL income over £2.6M and main worker on 10 consultancy projects (UCL income over £270k)

Research Interests

My principal research interests lie in three main areas; developments in design methodology; solutions to engineering design problems of importance to the maritime domain; and the future of engineering design education. My future research plans build on past activities in these three areas. Key areas of interest in the development of design methodology include; architecture and arrangements (e.g. layout) and spatial design; the incorporation of risk and uncertainty; and approaches to complexity in modern engineering design for physically large and complex systems.

The incorporation of architecture and arrangements in design needs to be developed into the same level of rigorous research and practice as other aspects of ship design, such as hydrodynamics and structures. Areas of interest include; characterisation and quantification of spatial arrangements performance; knowledge capture and management within a typically holistic and integrative problem; interactive and semi-automatic arrangements generation; and the development of true computer aided design as an aid to creativity, through concepts such as computer-aided sketching. While risk has been applied, in a highly mathematical way, to some aspects of engineering design (such as ship damaged stability) in more procedural and management oriented approaches (such as Formal Safety Assessment, FSA), developments in computer hardware and software offer the possibility of exploring a wider range of options in design, so allowing more holistic approaches to risk. Importantly uncertainty (traditionally managed with design margins) should be developed for early stage design and decision making. The planned construction of complex systems – i.e. those with emergent properties – is a relatively recent development in engineering and has introduced new problems, most notably in defence procurement and software development, requiring interdisciplinary work to address.

Although my primary interest in these arises from their applications to ship and submarine design, the methodological research is seen as an area for interdisciplinary collaboration both with other design domains, such as architecture, civil, aeronautical and software engineering, and also with other research areas, such as human-computer interaction and virtual reality. This research is also seen to have potential longer term impacts on the teaching of design at university level, and this has started to influence my current lecturing to Naval Architecture and Marine Engineering MSc students.

Although much of my research has been applied to naval ship design, there are seen to be areas of wider application to civilian vessels, specifically to complex and bespoke vessels, such as superyachts and support vessels for future offshore infrastructures. This is reflected in my technical solution oriented research interests, which include; future offshore infrastructure including renewable energy, marine mineral and food resources and even floating habitats; emissions reduction and energy efficiency in ship design; novel hullforms, such as multihulls; all-electric weapons systems, and uninhabited vehicles for a range of naval and civilian tasks and their impact on ship and submarine design.

My educational research interests cover two main areas. The first is how to properly integrate modern computer and numerical approaches into the holistic problem of engineering design education to develop future engineers who are not only able to solve predefined numerical problems, but are able to define which numerical problems need to be solved. This has relevance in educational software development and the use of virtual "hands-on" learning for complex products that are too physically large to bring into the classroom. I have begun to consider some of the particular problems of teaching engineering as decision making and judgement in the design exercises developed with colleagues in the UCL MRG. The second area is the question of diversification of ship design education at UCL to allow the university to address the design of civilian vessels, particularly service vessels, making use of lessons from naval ship design.

Major Research Projects – Total UCL Budget Approximately £2.6M

2015 – : Co-investigator on ONR funded NICOP project on distributed systems, including supervision of a Post-Doctoral Research Assistant, starting in September 2015, running for 5 years with a UCL budget of approximately $500k (UCL PI: Prof. David Andrews).
2013 – 2017: Research Associate and named researcher on the EPSRC funded "Shipping in Changing Climates" project continuing the investigation of potential reductions in the Carbon Dioxide emissions of shipping, UCL budget approximately £500k (PI: Dr. Tristan Smith, UCL Energy Institute).
2012 – 2015: Research Associate and named researcher on the EU FP7 funded "FAROS" project, investigating a probabilistic approach to integration of human factors into ship design, UCL budget approx. €250k (UCL PI: Prof. David Andrews).
2012 – 2013: Research Associate and manager on the Rolls-Royce led ETI-funded Marine Systems Integration Project, part of the Heavy Duty Vehicle Efficiency programme, UCL Mechanical Engineering Budget approx. £48K (UCL PI: Dr. Tristan Smith, UCL Energy Institute).
2011 – 2015: Research Associate on the ONR funded NICOP project "Preliminary Ship Design General Arrangements" investigating the general arrangement design methods, UCL budget approx. $560K (UCL PI: Prof. David Andrews).
2010 – 2013: Research Associate and named researcher on the RCUK / EPSRC funded "Low Carbon Shipping: A Systems Approach" project investigating the potential for reductions in the Carbon Dioxide emissions of shipping, UCL budget approximately £560k (PI: Prof. Paul Wrobel).

2009 – 2012: Research Associate on the EU FP7 funded "FIREPROOF" project, investigating a probabilistic approach to the fire safety of passenger ships, UCL budget approx. €200k (UCL PI: Prof. David Andrews).
2004 – 2007: Research Assistant on EPSRC funded project "Guidance on the Design of Ships for Enhanced Escape and Operation", investigating the integration of the simulation of personnel movement in the ship design process, including management of the Research Student involved, UCL budget approx. £240K plus £15K from SSG (UK MoD) (UCL PI: Prof. David Andrews).
2001-2003: Support to SSA ITMC LINK funded project to investigate "Design for Production application of Design Building Block methodology", UCL budget approx. £110K (UCL PI: Prof. David Andrews).

Consultancy Research and Design Work – Total UCL Budget Approximately £270k

2015: Concept design study for COTECMAR (Colombian MoD) (£10k UCL tasking)
2013 – 2014: Continuing support to Naval Design Partnership (UK MoD) in the development of the LAURA standard (£9.7k total UCL tasking).
2012 – 2013: Support to Naval Design Partnership (UK MoD) in the development of an international standard for the launch and recovery of manned and uninhabited craft (LAURA) (£23.5k UCL tasking).
2009: Concept design study and options survey for Naval Design Partnership (UK MoD) (£7.4k UCL tasking).
2008: Awarded study contract by EU WEGEMT VISIONS Programme "ConNECT – Concept of Novel Effective Cargo Transport" July 2008 (£9k UCL tasking).
2007: Awarded study contract by EU WEGEMT VISIONS Programme "Visionary Concepts for Vessels and Floating Structures" June 2007 (£14.5k UCL tasking).
2006: Partner in bid by Canadian defence contractor for "Joint Support Ship" study for Canadian Armed Forces (£12k).
2003: Contract from US Navy Office of Naval Research on adaptation of UCL-GRC design tool SURFCON to US LSC studies ($158k UCL tasking).
2003: Concept Design Study on Mothership Concept for UK MoD Future Business Group (FBG) in partnership with BMT-DSL (£25k UCL tasking).
2002: Application of Design Building Block Methodology to design investigations on Future Surface Combatant FSC/FBG DPA MoD (£38k UCL tasking).

Other Work and Collaboration

June 2017: Organised the two-day 2017 UK MoD / NL MoD sponsored Launch and Recovery Forum, hosted at UCL (http://www.larsforum.org/)
2015-16: Naval architectural support, with Ema Muc-Pavic (MRG), to the UCL Bartlett School of Architecture's "Flood House" project; a floating structure deployed for two months in the Thames Estuary to investigate future floating home concepts. http://flood.house/
April-June 2016: Collaboration with Associate Professor Henrique Murilo Gaspar of NTNU Ålesund on information visualisation methods during his 3-month placement at UCL
2016: Invited attendance and presentations to the NATO AVT 238 (RTG) research group on "Early stage warship design & procurement for operational effectiveness and affordability"
2007 – : Representative on UCL team contributing to the regular MoD Virtual Ships Advisory Group (ViSAG) meetings.

Teaching and Administration Experience at UCL

2017 – ongoing: Assisting in developing a new three-month Maritime Design module for the UCL undergraduate Ocean Engineering minor (part of the UCL Integrated Engineering Programme).

2017 – ongoing: Lecturing to UCL Submarine Design Course; "Submarine General Arrangements" (120 minute lecture to professional attendees).
2017 – ongoing: Second supervisor to PhD student on BMT funded research into "Optimisation of Spatial Arrangements in Ship Design" (Principal supervisor Prof. Giles Thomas).
2016 – : Conception, development and teaching of the new half-day "Introductory Ship Design Exercise" to MSc Naval Architecture students.
2016 – : Increased support to NAME MSc course, including assisting with supervision of the OPV Design Exercise, development of future tools and lecture material for the Ship Design Exercise.
2014 – *ongoing*: Second supervisor to PhD student on BAE Systems / EPSRC CASE funded research into "The Future Boundaries of UXV Technology" (Principal supervisor Prof. David Andrews).
2013 – *ongoing*: Lecturer to NAME MSc students, MTEC Marine Engineering and Naval Architecture students on "Main and Auxiliary Machinery: some practical considerations" (90 minute lecture to each group), "Aesthetic Considerations in Ship Design" (60 minute lecture to NAME MSc students), "General Arrangements" (120 minute lecture to NAME MSc students), "Emissions Reduction in Ship Design" (60 minute lecture to NAME MSc students) and "Hullform Design: Some Examples" (90 minute lecture to NAME MSc students). Joint lecture on "Architectural Considerations in Ship Design" with Prof. David Andrews (120 minute lecture to NAME MSc students).
2013 – *ongoing*: Second supervisor to PhD student on BAE Systems / EPSRC CASE funded research into "Design for Support" (Principal supervisor Prof. David Andrews).
2012 – 2016: Second supervisor to PhD student on Rolls-Royce / EPSRC funded research into "Novel Ship Architectures and Ship Performance Implications Through the use of Advanced Gas Turbine Based Power Plants" (Principal Supervisor Prof. David Andrews).
2012 – 2016: Second supervisor to PhD student on Babcock / IMPACT funded research into "The Design of a UXV Mothership Submarine", thesis examined successfully in July 2016 (Principal supervisor Prof. David Andrews).
2010 – 2014: Second supervisor to PhD student on the EPSRC funded "Low Carbon Shipping: A Systems Approach" project, thesis examined successfully in February 2014 (Principal supervisor Prof. Alistair Greig).
2010 – *ongoing*: Secondary supervision of undergraduate and postgraduate individual projects.
2007 – 2010: Supervised undergraduate lab on the behaviour of a planning craft, including use of the departmental towing tank apparatus and marking of the student reports.
2007: Lecturer in undergraduate "Mechanics of Marine Vehicles" course, including 8 hours of lectures and 2 hours of tutorials.
2006 – *ongoing*: Assisting with populating and maintaining equipment database for MSc Ship Design Exercise, including warship combat system and machinery installation data.

Regular Conference and Journal Submissions

Commencing in 2003, papers are presented at the International Marine Design Conference (IMDC) (triannual), RINA Warships conference (annual), RINA International Conference on Computer Applications in Shipbuilding (ICCAS) (biannual), International Conference on Computer Applications and Information Technology in the Maritime Industries (COMPIT) (annual) and IMarEST International Naval Engineering Conference (INEC) (biannual).

Publications by Research Themes;

My publications are grouped by research theme; Design Methodology; Safety, Survivability and Human Factors; Low Carbon Technologies; Uninhabited Vehicles; Electrification of Ships; Integrating Marine Engineering and Ship Design; and Design Studies

Design Methodology

Journal Papers

- Brefort, D., Shields, C., Habben Jansen, A., Duchateau, E., Pawling, R., Droste, K., Jasper, T., Sypniewski, M., Goodrum, C., Parsons, M.A., Yasin Kara, M., Roth, M., Singer, D.J., Andrews, D., Hopman, H., Brown, A., Kana, A.A., "An architectural framework for distributed naval ship systems", Ocean Engineering 147 (2018), pp. 375-385, https://doi.org/10.1016/j.oceaneng.2017.10.028
- Pawling, R.J., Percival, V., & Andrews, D.J., "A Study Into the Validity of the Ship Design Spiral in Early Stage Ship Design", SNAME Journal of Ship Production and Design, May 2017, Vol.33, No.2, ISSN 2158-2866.
- McDonald, T., Andrews, D.J., & Pawling, R.J., "A Demonstration of an Advanced Library Based Approach to the Initial Design Exploration of Different Hullform Configurations", Computer-Aided Design, Vol. 44, Issue 3, March 2012, pp. 209-223.
- Pawling, R.J., & Andrews, D.J., "Design Sketching for Computer Aided Preliminary Ship Design", Ship Technology Research / Schiffstechnik, Vol.58, No. 3, September 2011, Institute of Ship Technology and Ocean Engineering, ISSN 0937-7255.
- Andrews, D.J., & Pawling, R.J., "A Case Study in Preliminary Ship Design", International Journal of Maritime Engineering, Vol.150 Part A3, 2008. Discussion and Authors' reply IJME, Vol. 151, Part A1, 2009 - awarded RINA "W H C Nicholas Prize 2009" for the best paper on the subject of ship design by an author under 30 (R Pawling).

Conference Papers

- Pawling, R.J., Kouriampalis, N., Esbati, S., Bradbeer, N., Andrews, D.J., "Expanding the Scope of Early Stage Computer Aided Ship Design". International Conference on Computer and IT Applications in the Maritime Industries (COMPIT). Cardiff, UK. May, 2017.
- Calleya, J., Pawling, R.J., Ryan, C., Gaspar, H.M., "Using Data Driven Documents (D3) to Explore a Whole Ship Model", presented to the IEEE 11th International Conference on System of Systems Engineering (SoSE) 2016, June 12-16, Kongsberg, Norway.
- Esbati, S., Piperakis, A.S., Pawling, R.J., Andrews, D.J., "Design for Support in the Initial Design of Naval Combatants", International Conference on Computer Applications in Shipbuilding (ICCAS), RINA, Bremen, September 2015.
- Pawling, R.J., Piperakis, A.S., Andrews, D.J., "Developing Architecturally Oriented Concept Ship Design Tools for Research and Education", International Marine Design Conference (IMDC) 2015, Tokyo, May 2015.
- Esbati, S., Piperakis, A.S., Pawling, R.J., Andrews, D.J., "Evaluation of Supportability in the Preliminary Design of Naval Ships", International Conference Warship 2015: Future Surface Vessels, RINA, Bath, June 2015.
- Collins, L.E., Andrews, D.J., Pawling, R.J., "A New Design Approach for the Incorporation of Radical Technologies: Rim Drive for Large Submarines", IMDC 2015, Tokyo, May 2015.
- Purton, I.M., Pawling, R.J., Andrews, D.J., "The Use of Computer Tools in Early Stage Design Concept Exploration to Explore a Novel Submarine Concept", IMDC 2015, Tokyo, May 2015.
- Pawling, R.J., Morandi, R., Andrews, D.J., Shields, C., Singer, D., Duchateau, E., Hopmann, H., "Manifestation of Style and its Use in the Design Process", 13th International Conference on Computer Applications and Information Technology in the Maritime Industries (COMPIT), Redworth, UK, 12-14 May 2014
- Pawling, R.J., Andrews, D.J., Piks, R., Singer, D., Duchateau, E., Hopman, H., "An Integrated Approach to Style Definition in Early Stage Design", 12th COMPIT, Cortona, Italy, 15-17 April 2013.

- Andrews, D.J., Duchateau, E.A.E., Gillespe, J., Hopman, J.J., Pawling, R.J., Singer, D.J., "State of the art report: Design for layout", International Marine Design Conference (IMDC) 2012, Glasgow.
- Andrews, D.J., Percival, V., Pawling, R.J., "Just How Valid is the Ship Design Spiral Given the Existence of Cliffs and Plateaux?", IMDC 2012, Glasgow.
- Pawling, R.J., Andrews, D.J., "Design Sketching – The Next Advance in Computer Aided Preliminary Ship Design?", COMPIT 2011, Berlin, May 2011.
- Andrews, D.J., McDonald, T., Pawling, R.J., "Combining the Design Building Block and Library Based Approaches to improve Exploration during Initial Design", COMPIT 2010, Gubbio, Italy, April 2010.
- Andrews, D.J., Pawling, R.J., "The Impact of Simulation on Preliminary Ship Design", IMDC 2009, Trondheim, Norway, May 2009.
- Andrews, D.J., Casarosa, L., Pawling, R.J., "Interactive Computer Graphics and Simulation in Preliminary Ship Design", COMPIT 2008, Liege, Belgium, April 2008.
- Andrews, D.J., Pawling, R.J., "Research into the Use of Computer Aided Graphics in Preliminary Ship Design", International Conference on Computer Applications in Shipbuilding (ICCAS), RINA, Portsmouth, September 2007.
- Andrews, D.J., Pawling, R.J., "The Application of Computer Aided Graphics to Preliminary Ship Design", IMDC 2006, Ann Arbor MN, May 2006.
- Andrews, D.J., Pawling, R.J., "SURFCON – A 21st Century Ship Design Tool", IMDC 2003, Athens, May 2003.

Public Lectures

- Pawling, R.J., "From Frigates to Support Ships – A New Approach to Sketching in Computer Aided Ship Design", Presented to a meeting of the RINA London Branch, December 12th, 2007.

Other Publications

- Pawling, R.J., "Introduction – What Makes a Warship?", chapter in the IMarEST Encyclopedia of Maritime and Offshore Engineering, Online ISBN: 9781118476406, DOI: 10.1002/9781118476406, published May 2017

Safety, Survivability and Human Factors

Journal Papers

- Pawling, R.J., Grandison, A., Lohrmann, P., Mermiris, G., Pereira Dias, C., "Methods and Tools for Risk-Based Approach to Fire Safety in Ship Design", Ship Technology Research / Schiffstechnik, Vol 59(3) pp38-49, 2012, ISSN 0937-7255
- Andrews, D.J., Casarosa, L., Pawling, R.J., Galea, E., Deere, S., Lawrence, S., (2008) Integrating personnel movement simulation into preliminary ship design. IJME, Vol.150 Part A1, Discussion IJME, Vol 150, Part A3, 2008 - awarded RINA "Samuel Baxter Prize 2008" for the best paper on the subject of ship safety by an author under 30 (R Pawling).

Conference Papers

- Piperakis, A.S., Pawling, R.J., Andrews, D.J, "The Integration of Human Factors into Preliminary Risk-Based Ship Design", International Conference on Computer Applications in Shipbuilding (ICCAS), RINA, Bremen, September 2015.
- Pawling, R.J., Harmer, S., Campbell, J.D.C, Launchbury, C., "Survivability: The Human Element", International Conference Warship 2015: Future Surface Vessels, RINA, Bath, June 2015
- Mermiris, G., Grandison, A., Themelis, N., Pawling, R.J., Lohrmann, P., "Fire Risk Modelling", International Marine Design Conference (IMDC) 2012, Glasgow.

- Piperakis, A.S., Andrews, D.J., Pawling, R.J., "An Integrated Approach to Naval Ship Survivability in Preliminary Ship Design", International Conference Warship 2012: the Affordable Warship, RINA, Bath, June 2012.
- Pawling, R.J., Grandison, A., Lohrmann, P., Mermiris, G., Pereira Dias, C., "The Development of Modelling Methods and Interface Tools Supporting a Risk Based Approach to Fire Safety in Ship Design", 11th COMPIT, Liege, Belgium, 16-18 April 2012 – awarded the GL COMPIT 2012 award for special scientific achievements (R Pawling). Reprinted in Hansa and MITE magazines.
- Andrews, D.J., Casarosa, L., Pawling, R.J., "Integrating Simulation and Computer Aided Ship Design Software and Processes", International Conference on Computer Applications in Shipbuilding (ICCAS), RINA, Shanghai, September 2009.
- Andrews, D.J., Casarosa, L., Pawling, R.J., Galea, E., Deere, S., Lawrence, S., "Integrating Personnel Movement Simulation Into Preliminary Ship Design", Human Factors in Ship Design, Safety and Operation, RINA, London, March 2007, reprinted RINA International Journal of Maritime Engineering 2008.
- Andrews, D.J., Casarosa, L., Pawling, R.J., "Integrating the Simulation of Operations into Preliminary Ship Design", NAV 2006, Genoa, June 2006.
- Andrews, D.J., Boxall, P., Casarosa, L., Deere, S., Galea, E., Gwynne, S., Lawrence, P., Pawling, R.J., "Integrating Ship Design and Personnel Simulation", WMTC 2006, IMarEST, London, March 2006.
- Andrews, D.J., Pawling, R.J., Casarosa, L., "Integrating Ergonomics into Ship Design", CETENA Human Factors Conference, Genoa, October 2005.

Other Publications

- Pawling, R.J., Puisa, R., "Mitigating Human Error By Design", The Naval Architect, September 2014, London: RINA
- Editor of the "Proceedings of the Second FAROS Public Workshop", published by AALTO University, Finland, ISBN: 978-952-60-5873-3 (print) 978-952-60-5872-6 (PDF)
- Editor of the proceedings for the first FAROS Public Workshop, published on-line via the project website. http://faros-project.eu/

Low Carbon Technologies

Journal Papers

- Suárez de la Fuente, S., Larsen, U., Pawling, R.J., García Kerdanc, I., Greig, A., "Using the Forward Movement of a Container Ship Navigating in the Arctic to Air-Cool a Marine Organic Rankine Cycle Unit", Energy Procedia, Volume 129, Energy Procedia Volume 129, https://doi.org/10.1016/j.egypro.2017.09.230
- Calleya, J., Pawling, R.J., Grieg, A., "Ship Impact Model for Technical Assessment and Selection of Carbon Dioxide Reducing Technologies (CRTs)", Ocean Engineering 97 (2015) pp. 82-89 DOI: http://dx.doi.org/10.1016/j.oceaneng.2014.12.014

Conference Papers

- Suárez de la Fuente, S., Larsen, U., Pawling, R.J., García Kerdanc, I., Greig, A., "Using the Forward Movement of a Container Ship Navigating in the Arctic to Air-Cool a Marine Organic Rankine Cycle Unit", IV International Seminar on ORC Power Systems (ORC2017), 13-15 September 2017, Milano, Italy, reprinted in Energy Procedia.
- Suárez de la Fuente, S., Calleya, J., Pawling, R.J., Smith, T., "Calculated EEOI improvements using ship energy efficiency methods", presented to the Shipping in Changing Climates (SCC) Conference, London UK, 4th – 5th September 2017

- Calleya, J., Suárez de la Fuente, S., Trodden, D., Pawling, R.J., "Designing Future Ships and Marine Systems for Future Operating Conditions with a Low Carbon Intensity", presented to the Shipping in Changing Climates (SCC) Conference, Newcastle UK, 10th – 11th November 2016
- Calleya, J., Suárez de la Fuente, S., Pawling, R.J., Smith, T., "Designing Future Ships for Significantly Lower Energy Consumption", 10th Symposium on High-Performance Marine Vehicles (HIPER), Cortona Italy, 17th – 19th October 2016,
- Pawling, R.J., Suárez de la Fuente, S., Andrews, D. J., "The Potential Use of Energy Saving Technologies in Future Patrol Combatants", International Conference Warship 2016: Advanced Technologies in Naval Design, Construction and Operation, RINA, Bath, June 2016
- Raucci, C., Calleya, J., Suárez de la Fuente, S., Pawling, R.J., "Hydrogen on Board Ship: A First Analysis of Key Parameters and Implications", presented to the Shipping in Changing Climates (SCC) Conference, Glasgow UK, 24th – 26th November 2015.
- Calleya, J., Pawling, R.J., Greig, A., "A Data Driven Holistic Early Stage Design Process to Design Profitable Low Emission Cargo Ships", IMDC 2015, Tokyo, May 2015.
- Calleya, J., Pawling, R.J., & Greig, A., "Ship Design and Emissions Abatement Options Considering EEDI", Int. Conf. Influence of EEDI on Ship Design, RINA, London, September 2014
- Calleya, J., Pawling, R.J., Smith, T.W.P., Greig, A., "Ship Design and Evaluation for a Greenhouse Gas constrained future", Presented to The Environmentally Friendly Ship, Royal Institute of Naval Architects, 28-29 Feb. 2012. Also reprinted as: "Calibrating the Future", The Naval Architect, Royal Institute of Naval Architects, January 2013.
- Calleya, J., Pawling, R.J., Greig, A., Bucknall, R., "Assessing The Dependence Of Carbon Dioxide Emission Reduction Potential Of Natural Gas On The Size And Topology Of Container Carriers And Other Ship Types", Gas Fuelled Ships Conference 2011, Rotterdam, The Netherlands, October 2011.
- Calleya, J., Mouzakis, P., Pawling, R.J., Bucknall, R. Greig, A., "Assessing the Carbon Dioxide Emission Potential of a Natural Gas Container Carrier", International Conference on Technologies, Operations, Logistics and Modelling for Low Carbon Shipping, LCS 2011, Glasgow, 2011.

Other Publications

- Calleya, J., Suárez de la Fuente, S., Pawling, R.J., "Consideration of How to Progress the Matter of Reduction of GHG Emissions from Ships; Calculated EEOI improvements using ship energy efficiency methods", ISWG-GHG 1/2/10, submitted 12th May 2017 (Information document submitted to IMO MEPC intersessional meeting of the working group on reduction of GHG emissions from ships)

Uninhabited Vehicles

Conference Papers

- Kouriampalis, N., Pawling, R.J., Andrews, D.J., "The Implications of Uninhabited Vehicle Technology on Naval Fleet Structures and Naval Ship Design", RINA International Conference on Computer Applications in Shipbuilding (ICCAS) 2017, Singapore
- Robb, M., Lewis, D., Burgess, A., Thompson, M., Pawling, R.J., Carette, N., "The Application of Side Planers and Capture Lines for Launch and Recovery of Offboard Assets from Naval Combatants", ASNE Launch and Recovery Symposium, Maryland, November 2014
- Pawling, R.J., Andrews, D.J., "Large Uninhabited Vehicles and the Minor War Vessel", International Conference Warship 2013: Minor Warships, RINA, Bath, June 2013.
- Pawling, R.J., Andrews, D.J., "A Submarine Concept Design – The Submarine as an UXV Mothership", International Conference Warship 2011: Naval Submarines and UUVs, RINA, Bath, June 2011.

- Pawling, R.J., Andrews, D.J., “Three Innovative OPV Designs Incorporating a Modular Payload for UXVs”, International Conference Warship 2010: Advanced Technologies in Naval Design and Construction, RINA, London, June 2010.
- Pawling, R.J., Andrews, D.J., “The Ship Design Challenge of Naval Uninhabited Aerial Vehicles”, International Conference Warship 2009: Air Power at Sea, RINA, London, June 2009.

Electrification of Ships

Conference Papers

- Whitelegg, I., Pawling, R.J., Bucknall, R.W.G., “The impact of pulse loads on electric warship power systems”, Presented to the SNAME Maritime Convention, Texas, October 2014
- Andrews D.J., Bucknall, R., Pawling, R.J., Greig, A., McDonald, T., “The Impact of Integrated Electric Weapons on Future Warship Design Using Conventional and Unconventional Hullforms”, Engine as a Weapon (EAAW) 2011, IMarEST, London.
- Andrews, D.J., Bucknall, R., Pawling, R.J., “The Impact of Integrated Electric Weapons on Future Warship Design”, INEC 2010, IMarEST, Portsmouth.
- Andrews, D.J., Greig, A., Pawling, R.J., “The Implications of an All Electric Ship Approach on the Configuration of a Warship”, Proc. International Naval Engineering Conference (INEC) 2004, Institute of Marine Engineering, Science and Technology (IMarEST), Amsterdam.

Integrating Marine Engineering and Ship Design

Conference Papers

- Fitzgerald, M.D., Pawling, R.J., Groom, J., Andrews, D.J., “A Holistic Approach to Machinery Choice in Early Stage Ship Design”, IMDC 2015, Tokyo, May 2015.
- Fitzgerald, M.D., Andrews, D.J. Pawling, R.J., “Considerations In A Holistic Investigation Of The Feasibility And Potential Advantages Of Gas Turbine Based Propulsion For Future Container Ships”, Int. Conf. Design & Operation of Container Ships, RINA, London, May 2014
- Greig, A., Muc-Pavic, E., Pawling, R.J., “Marine Engineering challenges for Trimaran Small Waterplane Area Centre Hull (TriSWACH) Warships”, International Naval Engineering Conference (INEC) 2014, IMarEST, Amsterdam, May 2014
- Greig, A., Coombes, J., Andrews, D.J., Pawling, R.J., “Modelling the Heat Distribution in a Warship”, WMTC 2009, IMarEST, Mumbai, India, 2009.

Design Studies

Journal Papers

- Muk-Pavic, E., Pawling, R.J., Salha, A., “Modelling of Support Systems for Offshore Wind Farms”, RINA International Journal of Marine Design, Trans. RINA, Vol 157, Part C1, 2015
- Andrews, D.J., Pawling, R.J., “Concept Studies for a Joint Support Ship”, Journal of Naval Engineering, Vol. 44, Book 2, 2008

Conference Papers

- Muc-Pavic, E., Salha, A., Pawling, R.J., “Modelling of Support Systems for Offshore Wind Farms”, RINA conference on Design and Operation of Offshore Wind Farm Support Vessels”, RINA, London, January 2014
- Andrews, D.J., Pawling, R.J., “Concept Studies for a Joint Support Ship”, International Conference Warship 2007: The Affordable Warship, RINA, Bath, June 2007, Reprinted in Journal of Naval Engineering, Vol. 44, Book 2.
- Andrews, D.J., Pawling, R.J., “Innovative Ship Design for High Speed Adaptable Littoral Warfare”, Int. Conf. Warship 2006: Future Surface Warships, RINA, London, June 2006.

- Andrews, D.J., Pawling, R.J., "Fast Motherships - A Design Challenge", Int. Conf. Warship 2004: Littoral Warfare & the Expeditionary Force, RINA, London, June 2004, reprinted in RINA publication "Warship Technology", 2014

Papers in Preparation

- *Calleya, J., Suárez De La Fuente, S., Trodden, D., Pawling, R.J., "Whole Ship Model – holistic early-stage tool for designing energy efficient ships" paper drafted, target publication is Applied Energy, target submission date late 2017.*
- *Piperakis, A.S., Gaspar, H.M., Pawling, R.J., Andrews, D.J., "Designing Ships From the Inside Out - A Collaborative Object-Oriented Approach for the Design Building Block Method", paper drafted, target publication is Ocean Engineering, target submission date late 2017.*
- *Co-author on journal Paper on "The Use of Image Processing Techniques to Better Visualise Changes in Early Stage Ship Design", paper outlined, planned to submit in early 2018.*

Refereeing

Refereeing provided to the following journals and peer-reviewed conferences: Proceedings of the Royal Society A; Ocean Engineering; RINA International Journal of Maritime Engineering, SNAME Journal of Ship Production and Design, SNAME Maritime Convention 2017.

Outreach Activities

2014: Assessor for the Engineering Development Trust (EDT) Go4SET Celebration & Assessment Day
2008: Design of leaflets advertising the UCL NA/ME MSc and Submarine Design Exercise
2006: Collaboration with UCL Media Resources to develop videos, leaflets and posters advertising the departmental research activities

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Work Experience

2014: Awarded two-year BMT Fellowship in Naval Ship Design, total value £50K.
2009: Returned to UCL as a Post-Doctoral Research Associate to continue research into applications of the Design Building Block approach.
2008 – 2009: Employed by Graphics Research Corporation (GRC) Ltd on developing user applications based on the EPSRC funded research into personnel movement and developing training for new PARMARINE-SURFCON users.
2004: Assisted Graphics Research Corporation (GRC, now Qinetiq), with Paramarine training for MTG (the main naval ship design agency in Germany) in Hamburg, Germany.
2001 – 2008: Research Assistant in the UCL Design Research Centre (DRC), Department of Mechanical Engineering, UCL. Main research areas were the application of the Design Building Block approach and applications of the PARAMARINE-SURFCON software to ship studies.

Education

2001 – 2007:

University College London
Ph.D. entitled "The Application of the Design Building Block Approach to Innovative Ship Design", Ph.D. Awarded July 2007

1997 – 2001:

University College London

MEng in Naval Architecture and Marine Engineering
Graduated in 2001, Second Class Honours, Upper Division

Professional Memberships

Associate Member of the Royal Institution of Naval Architects (RINA).

Additional Qualifications and Awards

2001: Awarded “L.J. Rydill” MEng prize for best third year individual project, Awarded “RINA-BAE Systems Naval Architect Award” for best ship design project.