NED C. FORRESTER
Senior Engineer (ret.), Department of Applied Ocean Physics and Engineering
Woods Hole Oceanographic Institution, Woods Hole, MA 02543

Education:

B.S.E.E., Massachusetts Institute of Technology, 1976
M.S.E.E., Massachusetts Institute of Technology, 1976

Experience:

Digital Equipment Corporation: Student, 1973-1976; Engineer, 1976-1978; Senior Engineer, 1978-1979; Principal Engineer, 1980-1982; Consulting Engineer, 1982-1985
Woods Hole Oceanographic Institution: Research Engineer, 1985-1995; Senior Engineer 1995-2015, (retired 7/31/2015), Oceanographer Emeritus 2015-present
Hydroid, Inc.: Co-founder, engineer, 2001-2008; engineer (casual) 2008-present

Research Interests: Power, analog and digital electronics; signal processing; control systems; programming; simulation; electromagnetic compatibility; electric batteries; electric power transmission; electrophysical devices.

Equipment and Techniques Developed (• = major projects):

- Induction motor servo for printer carriage drive, 6/75-2/76
- Video character display chips and μ-processor control for VT-100 video terminal, 6/76-6/78
- Custom graphics display chips for workstations and video terminals, 1/80-7/85
- Electric propulsion system for Alvin, 7/85-8/86
- Electrical distribution system for Alvin, 8/85-5/86
- High efficiency, 6 Watt power supply for tomography receiver, 6/86-9/86
  Line frequency monitor and shutdown for Alvin battery chargers, 12/86-6/87
- Short and long baseline acoustic navigation system for Alvin, with digitally tuned filters, 8/86-1/90
- Transformer/inductor design optimization programs, 2/87-7/87
- 12 KVA power distribution and control system for the Argo/Jason tethered vehicles, 2/87-4/88
  Data reduction programs for Alvin data disks, 1/88-3/88
  Software to read Alvin serial data stream on PC, 3/88-5/88
  Digitally tunable 100 kHz analog front-end for acoustic modem, 3/88-9/88
  Alvin battery charging software, 7/89-9/89
- Overhaul of Alvin instrument panels and wiring, 12/88-8/89
- Electrical distribution system for Alvin with 120 Volt to 26 Volt DC/DC converters, 10/88-8/89
- 120 V to 28 V, 50 Amp power converter for Alvin hydraulic pump motor, 4/89-7/89
- UNIX/C programs for collection, logging and distribution of Alvin data, 11/88-9/89
- Digitally Programmable, 200 kHz acoustic receiver board, 4/89-10/89
  200 W power amp for Alvin's acoustic navigation transceiver, 2/89
  Installation on Alvin of prototype pressure-tolerant motor controllers, 12/89
  EIA-232 isolation modules, 11/89-8/90
  Improvements to Alvin Data Collector, including: renovation of real-time clock hardware and firmware, addition of event counters, and PC program to test camera data output, 2/90-9/90
- C software interfaces to Alvin data system for: Mesotech sonar, magnetometer, U.W. entrainment array, geocompass, heatflow probe, and other instruments, 12/89-8/90
  Alvin 286 computer and plasma display, 5/90-9/90
  5 ch. heatflow probe with heater, finished hardware and firmware, simulated thermal response of heater, 4/90-7/90
- 2000 V, 20 kW DC power system architecture for TROV/FOSS I vehicles, 1/90-10/90
  Power, control and status interfaces, and convection cooling for Alvin pressure-tolerant motor controllers, 10/90-5/91
  Thermal analysis of TROV tether, 11/90

- 20 kW, 400 HZ power transmission system for TROV vehicle, including protective devices and voltage control, 11/90-10/91

  Designed toroidal, low weight, oil cooled, pressure tolerant transformers for TROV power system, 12/90-7/91

  Expanded transformer design software to include three-phase transformers and calculation of temperature rise in a convection-cooled environment for rectangular and toroidal geometries, 4/91-7/91
- 400 Amp crowbar over-voltage protector for Jason/TROV/FOSS I, 6/91
- Ground-Fault-Interrupter for 1200 V, 35 KVA, 400 Hz system, 9/91-10/91
- Water-jet thruster manifold and valves for TROV, 10/91-2/92

  Software to combine attitude and angular rate data using LP/HP filter, 11/91
- Six DOF computer model of TROV vehicle system, 10/91-4/92

  Five axis PID control software for TROV vehicle, 1/92-4/92
- 12 kW, 60/400 Hz power transmission and distribution system for FOSS I vehicle, including custom transformers, 5/92-9/92
- Current-limited, short-circuit protected, 400 Volt, 3 Amp, solid-state power switch, 9/87-9/92
- Power, wiring and instrument interface design for FOSS I vehicle, 5/92-7/93
- Documentation system for FOSS I, including automated drawing and parts list compilation, 7/92-7/95

  8 channel, current-limited, 0.5 Amp, 50 Volt, isolated signal switch, 10/92

  Motor phase filter, 10 Amp, 3-phase, >70 db attenuation at 100 kHz, 5/93-6/93

  LC type, 900 Volt, TI arc-lamp ignitor circuit, and lamp current monitor, 3/93-4/93
- 3 Watt, low noise, low impedance split-rail power supply system for arctic acoustics, 7/93

  Relative Acoustic Tracking System accuracy analysis, for acoustic and inertial navigation errors, 10/93
- Heave compensating crane performance analysis and simulation, 11/93-4/94

  Common to Ground voltage monitor and clamp, 100 V, 3 A, 1/94

  PC software to operate FOSS video camera interface, 2/94
- Optical analysis of FOSS video camera dome port and first-order correction, 3/94

  FOSS Klein 595 Side-scan sonar interference reduction, 4/94

  Dynamic analysis of new TROV roll control system, 5/94
- REMUS AUV chassis wiring and system board design: power, analog and digital I/O for PC104 system and various instruments, 9/94

  Measurement and analysis of TOSS vehicle vertical drag coefficient, 11/94

  Software to capture digital scope waveforms from IEEE-488 bus, 11/94

  TROV bow thruster performance measurement and analysis, 11/94-1/95

  Closed loop control software for TROV vehicle with new bow thrusters, 12/94
- Failure analysis of Klein 595 sonar transducers, spice modeling and actual measurement of arc induced transients, 1/95-2/95

  Software for computer-assisted generation of purchase orders from parts lists, 4/95-9/95
- Design and construction of LEO-15 node and surface power and control systems, 5/95-8/96

  Joystick amplifier for driving servo valve coils, current limited, 8/95
- Design of TOSS II vehicle power and instrument wiring and construction of vehicle electronics, 3/95-10/95
- Design of signal and power wiring for TOSS II Mission Control Van, 8/95-10/95

  System integration of Klein 2000 side-scan sonar with TOSS II, including over 30 db internal interference reduction, addition of notch filters for suppression of CTFM interference, 9/95-7/96

  Intercom audible alert for TOSS system, 6/96

  Determination of GPS antenna requirements for reliable surface reception by REMUS AUV, 8/96-10/96
- Conversion of FOSS I tow vehicle to TOSS I (TOSS II equivalent), wiring of new Control Van, 5/97-10/97

  REMUS battery charging and data transfer through single contact and seawater return, 1/97-7/98
- Documentation and wiring of TOSS NAVCOM van, 2/98-4/98

  Remote control system for TOSS hydrographic and deep-tow winches, 5/98-6/98

  LEO Guest Port simulator for testing guest instruments, 5/98-3/00
- Experimental investigation of REMUS LA battery gassing and methods of hydrogen control, 5/98-8/98

  Electrical integration of micro-turbulence shear probes and related instruments on REMUS, 8/98
- Development of electrical parts database and maintenance tools for use with Orcad Capture CIS, 1/99-
- SAHRV motherboard, chassis wiring and support equipment, 3/99-10/99

- Method to multiplex power and 10Base2 Ethernet on two wire connection, 3/99-7/99
  Integration of Li-Ion smart batteries to REMUS SMBus, 4/00-10/01
- Li-Ion smart battery charge/discharge cycle tester and data logging and control software, 3/01-10/01
  GPS receiver/antenna installation for REMUS, 1/01-3/01
- Li-Ion 250 Wh battery for REMUS, including controller board with data communication, protection and charger, board test fixture, test and embedded battery software, 11/01-11/02
- 8 kWh Li-Ion battery system for SAMS: smart battery data system, 1.5 kW chargers with computer control and software, 10/01-4/03
  SAMS weight release controller board and software, 3/02-4/03
  SAMS radio system and antennas: GPS, ARGOS, Freewave modem, 10/01-7/03
- 7 kWh Li-Ion battery system for Tunnel AUV with 450 Wh battery packs and controllers, 7/02-12/02
- GPS, Iridium and 2.5 GHz WIFI ceramic patch antennas for deep ocean application, tuned for polyurethane encapsulation; passive, active, and L1/L2 GPS designs, 9/03-9/04
- Develop software for SMS messaging on Iridium, 10/03-7/04
- Guest instrument isolation switch, 20 A maximum, programmable current limit, signal isolation, 11/03-7/04.
- 5 kWh Li-Ion battery system for REMUS-600 and dock, using 500 Wh, 63 cell packs and REMUS control electronics, 5/03-9/04
- 5.2 kWh Li-Ion battery system for SAMS II, 650 Wh, 84 cell pack design, control and protection electronics, 5/03-9/04
  SAMS II battery chargers, upgrade to programmable voltage and current, 5/04-7/04
  SAMS II weight release board: added software to relay GPS by Iridium SMS during power emergency, 7/04.
- Review of U.S. DOT Hazardous Material Regulations (49CFR171-178), International Air Transport Association Dangerous Goods Regulations, and International Maritime Dangerous Goods Code for impact on Li-Ion battery transportation. 5/03-9/05
  Performance evaluation of REMUS-100 batteries over extended temperature range, 5/06-6/06
  LSG magnetic sensor integration in REMUS-600, test program support, 1/06-4/06
- Multi-channel towed acoustic array, per-channel digitizing electronics and network data telemetry, field reprogrammable, 1/06-8/09
- High-speed driver for high-intensity light emitting diode array, 20 MHz, 1 and 3 channels, 9/07-5/10
- Acoustic data analysis software for acoustic array data, 6/08-8/09
  Submersible load cell for array drag measurement, 11/08-9/09
  Study Low-power, long endurance REMUS AUV: main electronic, sensors and thruster, 11/08-9/09
  3-Axis magnetic sensor for towed array, 6/09-9/10
- 72-channel towed acoustic line array with per-channel, 3-axis gravity and magnetic sensors, 6/09-9/10
  Power control for REMUS-600 variable ballast system, 5/11-6/11
  Controller/interface for chip-scale atomic clock, 6/11-7/13
- Matlab simulation of solar/wind power generation for Ocean Observatories Initiative buoys, 9/11-11/11
- Pseudo-sinusoidal drive motor controller, major redesign and firmware upgrade, closed-loop commutation phase control, torque measurement from phase current, 12/11-8/13
  Perl code automation of Magtrol dynamometer in constant velocity and torque modes, 1/12-6/12
- Vehicle core redesign for reduced power consumption and wiring complexity, 9/12-
  5 Amp charge capability for REMUS battery controller, 12/13-3/14
  Migration of Orcad parts database to mySQL with Perl back-end for creation of new parts, 5/14-9/14

Courses Taught:

13.465, Ocean Instrument Field Laboratory, taught vehicle systems part of course, 95, 98
6.002, “Circuits and Electronics”, two-session tutorial, 4/04

Publications: Author or co-author of 22 technical publications (see attached bibliography).

Patents:

#4,769,637 “Video Display Control Circuit Arrangement”
#4,799,173 “Transformation Circuit to Effect Raster Operations”

Unpublished Results:

- "Alvin Emergency and Service Batteries", 8/86
  "Main Battery Charging Procedures", Alvin, 1/87
  "Line Transient Protector for GNB Battery Chargers", 1/87
- "Data Extraction Programs for Alvin Data Files" 1/89
  "Fault Current Calculations for the Alvin Electrical System", 6/89
  "Alvin Release Circuit Resistance and Current Calculations", 6/89
  "Telemetry Receiver Tunable Analog Acquisition Board", 10/89
  Contributions to "Alvin User Manual", 9/90
- "Specification for High Input Voltage DC/DC Converter", 10/90
- "Alvin Electrical Schematic, A000202", 12/90
  "Test Plan for Hydraulic Pump/Motor", for Alvin, 1/91
  "Alvin battery purchase, space, weight, power trade-offs", 3/91
  "Specification for 195 Amp-Hour Lead Acid Cells", 4/91
  "Jason 120 Volt System Over-voltage Protection Crowbar", 6/91
  "Toroidal Power Transformer Specification", 6/91
- "FOSS Vehicle Power Transformer Specification", 7/92
- Electrical schematic and parts documentation for TOSS I and II vehicles, 7/92-6/98
  "Factors Affecting ... Accuracy of Vehicle Mounted Relative Acoustic Tracking System RATS)", 10/93
- Electrical schematic and parts documentation for REMUS autonomous vehicles, 9/94-10/01
- "Transducer Failure Mechanism Search", 3/95
- Electrical schematic and parts documentation for LEO-15 Observatory, 5/95-9/98
- "LEO-15 Instrument Interface Specification", http://adcp.whoi.edu/LEO15/HARDWARE_DOC, 9/97-3/00
- "Safety Review of South Florida Ocean Measurement Center", 4/99 and 6/99 (consulting work for FAU)
- "Towed Optical Survey System: Technical Documentation", 7/00-9/02
  "SAMS Battery Setup and Calibration Procedure", 4/02
  "REMUS Smart Battery Tester", 6/02
  "REMUS Battery Controller Board Setup and Calibration Procedure", 8/02-9/02
- "REMUS Battery Description", 9/02
- "SAMS Battery Manual", 4/03
  "SAMS Battery Configuration Options", 5/03
  "12.75 inch and Docking Battery Configuration Options", 5/03
- "REMUS-600 Vehicle and REMUS-100 Dock Lithium Battery Data Package", 12/04
- "REMUS-6000 Battery Information" (description of battery, support and test equipment), 2/04-2/05
- "Approval Request for Shipping 'REMUS-600' Lithium ion Batteries", DOT, 5/05
- "REMUS-6000 Battery Manual", (use, maintenance and emergency information), 10/05-11/05
  "Request for Amendments to Competent Authority Approval 2005050020", DOT, 2/06, 5/07
  Internal Memo: "1 MHz Transducer Tuning", 12/07
  "REMUS-600/3000 and REMUS Dock Battery Manual", 4/09
  "REMUS100/600/3000/6000 Guest Port Electrical Specification", Forrester, N., Goldsborough, R., 10/08
  REMUS-600 alternate battery trade-off study, 5/09: battery_alternates.xls
- Internal memo: "Transducer tuning: 160, 200, 500, 1000 and 1400 KHz", 12/11
- "Networked Expandable Digital Sonar Array", 75 pp., (hardware description complete) 11/12-
- "105766 Sinusoidal Thruster Motor Controller", 20 pp., (hardware description complete) 8/13-
- "Core Electronics Upgrade: Guest Port Internal Connection Options", 18 pp., 4/13-5/13
- "Results of Fast Charge Test of REMUS 600 Battery", 12 pp., 10/13-11/13
- "102379 Battery Controller Functional Description", 45 pp., (hardware desc. complete), 1/14-2/14
- "REMUS 600 5 Amp Battery Charger Design Study", 24 pp., 12/13-5/14
- "106872 Vehicle Core Board", 38 pp., 1/15-6/15

Cruise Participation:

5/1/86-5/10/86: Alvin sea trials, 1986, Atlantis II.
1/9/87-1/21/87: Work on Alvin's charging and electrical systems, one Alvin dive, Atlantis II.

5/31/88-6/14/88: Sea trials of Alvin's new long and short base line navigation system., Atlantis II.
8/10/89-8/22/89: Alvin sea trials, 1989, Atlantis II.
2/27/93-3/9/93: FOSS I sea trials, USNS Wilkes.
6/24/93-6/30/93: FOSS I sea trails, USNS Wilkes.
4/12/94-4/18/94, 4/30/94-5/1/94: FOSS I sea trails, OCP Seacon.
11/8/94-11/14/94, FOSS I cruise support, USNS Wilkes.
10/24/95-11/6/95, TOSS II sea trials, USNS Silas Bent.
6/30/96-7/5/96, TOSS II sea trials, USNS Pathfinder.
8/8/96-8/11/96, TOSS II cruise support, USNS Pathfinder, Naples IT.
5/16/97-5/19/97, TOSS II sea trials, support of ASCP Installation, R.V. Ewing.
10/17/97-10/26/97, TOSS I sea trials, acceptance tests of upgraded TOSS I vehicle, USNS Bowditch.
7/16/98-7/30/98, REMUS field exercise in support of coastal modeling, docking trials.
9/14/98-9/18/98, REMUS field exercise in support of Navy Special Warfare VSW-MCM.
11/2/98-11/12/98, REMUS and docking support at AUV Fest '98, R/V Gyre.
10/11/99-10/23/99, REMUS field exercise three in support of Navy Special Warfare VSW-MCM.
6/11/00-6/15/00, REMUS field exercise FBE-H rehearsal in support of Navy Special Warfare VSW-MCM.
4/17/02-5/2/02, SAMS sea trials, USNS Heezen.
2/14/03-3/6/03, SAMS sea trials, USNS Pathfinder.
6/2/03-6/7/03, Inspection of NYC Rondout to West Branch aqueduct.
8/10/03-8/15/03, REMUS trials at AUV Fest '03, Keyport, WA.
7/10/04-7/21/04, SAMS II sea trials, Charleston-Nassau, USNS Pathfinder.
10/24/05-11/5/05, SAMS II re-build sea trials, Naha, Okinawa, Japan, USNS Bowditch.
5/28/08-6/6/08, NEST '08, Acoustic array experiments, off NJ USA, R/V Hugh Sharp.
7/25/08-8/12/08, PLUS/INP '08, Acoustic array experiments, off Kauai, HI, USA, R/V Melville.
10/24/08, SPACE '08, Acoustic communications experiments, REMUS towed array, MVCO, R/V Tioga.
7/25/09-8/10/09, PLUS/INP '09, Acoustic array experiments, off Kauai, HI, USA, R/V Knorr.
9/21/10-10/6/10, PLUS/INP '10, Acoustic array experiments, off San Diego, CA, USA, R/V Moana Wave.
11/1/13-11/15/13, CONKEX, PLUS sea trials, Key West, FL, NAWC-38.
7/30/14-9/4/13, Schnoor-14, U.S. Navy exercise, Guam, R/V Revelle.

Committees and Reviews (Internal):

Deep Submergence Advisory Committee, 2005-2015.
Replacement Human Occupancy Vehicle, Internal Oversight Committee, 2009-2013.

HROV (Nereus) battery design review, 4/2006.
Ocean Observatories Initiative power-system, docking and misc. reviews, 8/2011-3/2012.
RHOV (Alvin) electrical design review, 2/2012.
Deep Sea Challenger battery system review, 10-11/2013.
Sentry battery design review, 12/2014.

Outside Activities:

Design review and safety recommendations for South Florida Ocean Measurement Center (FAU), 1999.
NEPTUNE Power System, Preliminary Design Review, University of Washington, 2004.
Proposal review for NOPP: "Deep Ocean Station Pioneer (DOSP-900: A Real-time, Cabled, Deep-sea Geophysical Observatory", Steve Ramp, et al., 1999.
Papers Reviewed (all for IEEE Journal of Oceanic Engineering):
"An Interface System for Autonomous Undersea Vehicles", M. D. Feezor, et al., 1999.
"Powering Cabled Ocean Bottom Observatories", Harris and Duennebier, 2001.
"Power System Considerations for Undersea Observatories: The Basic Tradeoffs", Howe, Kirkham, and Vorperian, 2001.
"Current-to-Current Converter for Scientific Underwater Cable Networks", Asakawa, et al., 2006.

NED C. FORRESTER
Bibliography:

Forrester, N. C., “An Induction Motor Servo for a Printer Carriage Drive”, M.S. Thesis, Massachusetts Institute of Technology, May 1976.

Maloof, R.H., Forrester, N.C., Albrecht, C.E., “A Brushless Electric Propulsion System for the Research Submersible Alvin”, presented at IEEE, Oceans ’86 (not in proceedings), 1986.

Blake, W., English, P., Forrester, N., Furlong, T., Rose, R., Watson, R. Jr., “A VLSI Chip Set for an Integrated Text and Graphics Video Subsystem”, Solid-State Circuits Conference, Digest of Technical Papers, IEEE International, vol 29, pp. 126-127, 1986

Hosom, D.S., Forrester, N.C., Walden, B.B., “Alvin - 120 VDC / 28 VDC Electrical System”, IEEE, Proceedings of Oceans ’87, vol 3, pp. 1272-1277, 1987.

Forrester, N.C., “Power Transformer Design for Tethered Underwater Vehicles”, IEEE, Proceedings of Oceans ’92, vol. 2, pp. 877-882, 1992.

Purcell, M.J., Forrester, N.C., “Bobbing Crane Heave Compensation for the Deep Towed Fiber Optic Survey System”, SNAME, New England Section Fiftieth Anniversary Proceedings, May 6-8, 1994, Woods Hole, MA.

von Alt C.J., Forrester, N.C., “The Design of Small Diameter Neutrally Buoyant Electro-Optic Tether Cables for Maximum Power Transfer”, IEEE, Proceedings of Oceans ’94, vol. 2, pp. 465-470, 1994.

Forrester, N.C., Stokey, R.P., von Alt, C.J., Allen, B.G., Goldsborough, R.G., Purcell, M.J., Austin, T.C., “The LEO-15 Long-term Ecosystem Observatory: Design and Installation”, IEEE, Proceedings of Oceans ’97, vol. 2, pp. 1082-1088, 1997.

Stokey, R., Purcell, M., Forrester, N., Austin, T., Goldsborough, R., Allen, B., von Alt, C., “A Docking System for REMUS, an Autonomous Underwater Vehicle”, IEEE, Proceedings of Oceans ’97, vol. 2, pp. 1132-1136, 1997.

Allen, B., Stokey, R., Austin, T., Forrester, N., Goldsborough, R., Purcell, M., von Alt, C., “REMUS: A small, low cost AUV; System Description, Field Trials and Performance Results”, IEEE, Proceedings of Oceans ’97, vol. 2, pp. 994-1000, 1997.

von Alt, C., Allen, B., Arthur, R., Austin, T., Forrester, N., Goldsborough, R., Purcell, M., Stokey, R., Milgram, J., Babb, J., Broadmeadow, J., “A Systems Engineering Approach to Integrating Unmanned Underwater Vehicles into a Fully Automated Launch and Recovery System”, Office of Naval Research, *U.S. Navy Journal of Underwater Acoustics*, vol. 47, no. 4, pp. 1633-1650, October 1997, Classified.

Purcell, M., Stokey, R., Goldsborough, R., Austin, T., Forrester, N., von Alt, C., Allen, B., “The REMUS AUV Docking System: Overview and Test Results”, Marine Technology Society, *Ocean Community Conference ’98 Proceedings*, vol. 2, pp. 886-890, 1998.

Stokey, R., Austin, T., von Alt, C., Purcell, M., Forrester, N., Goldsborough, R., Allen, B., “AUV Bloopers or Why Murphy Must have been an Optimist: A Practical Look at Achieving Mission Level Reliability in an Autonomous Underwater Vehicle”, *Proceedings of the Eleventh International Symposium on Unmanned Untethered Submersible Technology*, pp 32-40, August 23-25, 1999.

Purcell, M., Allen, B., von Alt, C., Austin, T., Forrester, N., Goldsborough R., Stokey, R., "New Capabilities of the REMUS Autonomous Underwater Vehicle" IEEE, Proceedings of Oceans 2000, vol. 1, pp. 147-151, 2000.

von Alt, C., Allen, B., Austin, T., Forrester, N., Goldsborough, R., Purcell, M., Stokey, R., "Hunting for Mines with REMUS: A High Performance, Affordable, Free Swimming Underwater Robot", IEEE, Proceedings of Oceans 2001, pp. 117-122, 2001.

Stokey, R., Austin, T., Allen, B., Forrester, N., Gifford, E., Goldsborough, R., Packard, G., Purcell, M., von Alt, C., "Very Shallow Water Mine Countermeasures Using the REMUS AUV: A Practical Approach Yielding Accurate Results", IEEE, Proceedings of Oceans 2001, pp. 149-156, 2001.

Stokey, R., Allen, B., Austin, T., Goldsborough, R., Forrester, N., Purcell, M., von Alt, C., "Enabling Technologies for REMUS Docking: An Integral Component of an Autonomous Ocean Sampling Network", IEEE, *Journal Of Oceanographic Engineering*, v. 26, no 4, pp. 487-497, Oct. 2001.

von Alt, C., Allen, B., Austin, T., Forrester, N., Freitag, L., Goldsborough, R., Grund, M., Purcell, M., Stokey, R., "Semi-Autonomous Mapping System", IEEE, Proceedings of Oceans 2003, pp. 1709-1718, 2003.

Moline, M., Blackwell, S., von Alt, C., Allen, B., Austin, T., Case, J., Forrester, N., Goldsborough, R., Purcell M., Stokey, R., "Remote Environmental Monitoring UnitS (REMUS): An Autonomous Vehicle for Characterizing Coastal Environments", *Journal of Atmospheric and Oceanic Technology*, pp. 1797-1808, Nov. 2005.

Stokey, R., Roup, A., von Alt, C., Allen, B., Forrester, N., Austin, T., Goldsborough, R., Purcell, M., Jaffre, F., Packard, G., Kukulya, A., "Development of the REMUS 600 Autonomous Underwater Vehicle", IEEE, Proceedings of Oceans 2005, pp. 1301-1304, 2005.

Allen, B., Austin, T., Forrester, N., Goldsborough, R., Kukulya, A., Packard, G., Purcell M., Stokey, R., "Autonomous Docking Demonstrations with Enhanced REMUS Technology", IEEE, Proceedings of Oceans 2006, pp.-, 2006

Reif, R., Liffers, M., Forrester, N., Peal, K., "Lithium Battery Safety Program at Woods Hole Oceanographic Institution", American Society of Safety Engineers, *Professional Safety*, Feb. 2010.