

# Frank T. Ferrese, PhD, PE

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CONTACT INFORMATION FJT Technologies LLC  
414 First Avenue Haddon Heights, NJ 08035  
*Phone:* (856) 924-4690  
*E-mail:* frank.ferrese@fjttech.com  
*Web:* www.fjttech.com

PROFESSIONAL PROFILE Dr. Frank Ferrese is a highly experienced professional engineer and consultant specializing in design and control of electrical systems, electrical safety, power systems, industrial automation systems, and in root-cause failure analysis and forensics of electrical systems. As a researcher he is interested in cyber-physical systems, resilient control systems, control theory, and optimization theory. The engineering and technical support activities he has engaged in have included lead responsibility for the design and construction of shipboard systems, industrial automation systems, satellite communication systems, navigation systems, and control systems for vehicles and machinery. His responsibilities have been in both hardware and software design. He is an expert in software engineering and in software development processes. Dr. Ferrese has over 20 years of experience in the engineering of electrical systems and industrial control systems.

Currently, he is the President of FJT Technologies, LLC where he provides forensic engineering and engineering expert witness services. He is also actively conducting research for federal agencies such as the Office of Naval Research (ONR), Defence Advanced Research Projects Agency (DARPA), and Advanced Research Projects Agency - Energy (ARPA-E). He holds adjunct faculty appointments at Villanova University, Temple University, and Drexel University where he has taught courses in Electrical Engineering, Computer Science, and Mechanical Engineering.

EXPERTISE Electrical Systems, Electrical System Safety, Electrical Accidents, SCADA Systems, Control Systems, System Optimization, Sensors, Communication Systems, Power Systems, Cyber-Physical System Security, Statistical Analysis

EDUCATION **Villanova University**, Villanova, PA USA  
PhD, Engineering, May, 2013

**Villanova University**, Villanova, PA USA  
M.S., Computer Engineering, May, 2006

**Drexel University**, Philadelphia, PA USA  
B.S., Electrical Engineering, May, 1995

PROFESSIONAL EXPERIENCE **Naval Surface Warfare Center, Carderock Division (NSWCCD)**, Philadelphia, PA USA  
*Lead Research Engineer for Advanced Automation Systems* **February, 2005 - Present**  
Technical Responsibilities

- Execution of basic and applied research in support of the Office of Naval Research (ONR) in the areas of advanced automation, and control of distributed heterogeneous systems
- Execution of basic and applied research in support of internally funded R&D projects in the areas of control, autonomy, experimental verification and validation, computational intelligence, and dynamic systems modeling
- Founder and Director of the Controls, Autonomy, and Intelligent Systems Laboratory

- Provide subject matter expertise to organizations such as the Office of Naval Research (ONR) and Advanced Research Projects - Energy (ARPA-E) in the areas of control theory, computational intelligence, dynamic system modeling, hybrid systems
- Implementation, demonstration, verification and validation of control system hardware and software
- Design and construction of hardware in the loop controls experiments for verification and validation of advanced control methodologies
- Publish in peer reviewed forums and participate in the international research community

*Lead Engineer for Navigation and Steering Control Systems*      **March 2004 - September, 2005**

- Provided technical oversight for the design, installation, and support of shipboard navigation and control systems
- Developed specifications for navigation, steering control, and propulsion control systems for various ship classes
- Developed verification and validation tests for shipboard industrial control systems

*Engineering Manager - Navigation and Steering Controls Section*      **November 2000 - March 2004**  
 Manager for a section of 17 engineers, technicians, and support personnel working on programs related to navigation and steering control systems

*Lead Engineer LPD-17 Ship Control System*      **March 2000 - October 2000**  
 Lead engineer for LPD-17 class new construction Ship Control System (SCS) during the design, development and land based testing of the SCS

**Computational Systems Incorporated, Essington, PA USA**

*Senior Consultant*      **April 1999 - March 2000**  
 Consultant to major firms such as Xerox and Owens Corning in the area of Reliability Centered Maintenance programs for large production facilities

**Naval Surface Warfare Center, Carderock Division, Philadelphia, PA USA**

*Integrated Condition Assessment System Project Manager*      **November 1997 - March 1999**  
 Responsible for the technical direction of the Integrated Condition Assessment System program, which is a software based monitoring and analysis system for machinery equipment condition

*Submarine Antenna Systems Project Engineer*      **March 1992 - October 1997**  
 Supported the design, installation, and life cycle support of submarine antenna systems

ACADEMIC /  
 TEACHING  
 EXPERIENCE

**Temple University**

- Courses: Engineering Analysis, Electrical Circuits and Devices, Modern Control Theory, Digital Control Theory, Cryptography, Probability and Statistics, JAVA Programming

**Drexel University**

- Courses: Motor Controls

**Villanova University**

- Courses: Autonomous Control, Electric Motor Drives

**PhD Advisory Committee** member for Mr. Kyungjin Moon, **Georgia Institute of Technology** 2010

- Thesis topic: Self-Reconfigurable Ship Fluid-Network Modeling for Simulation-Based Design

**PhD Advisory Committee** member for Ms. Daili Zhang, **Georgia Institute of Technology** 2008

- Thesis topic: Multi-Agent Based Control with Distributed Dynamic Inference Engine for Large-scale Complex Systems

**PhD Advisory Committee** member for Mr. Yongchang Lee, **Georgia Institute of Technology** 2007

- Thesis topic: An Intelligent, Knowledge Based Multiple Criteria Decision Making Advisor for Systems Design

#### HONORS AND AWARDS

- Meritorious Service Award, Villanova University College of Engineering, 2014
- Institute of Electrical and Electronics Engineers (IEEE) Young Engineer of the Year, Philadelphia Section, 2007
- Member of the external advisory panel for Idaho National Laboratory Distinctive Signature in Instrumentation, Controls, and Intelligent Systems
- Member of the IEEE technical committee for Resilience and Security for Industrial Applications (ReSia)
- Reviewer for numerous transactions and conferences including IEEE Transactions on Systems, Man, and Cybernetics, American Control Conference, and IEEE/ASME Transactions on Mechatronics
- Letter of Commendation from Chief of Naval Operations Code N7C, Navigator / Oceanographer of the Navy for contributions to safety of navigation and mission accomplishment, 2005
- Letter of Commendation from DDG 1000 Program Manager, PMS 500 for outstanding performance as Integrated Bridge System and Navigation Systems Lead, 2006
- The American Society of Naval Engineers President's Award, 2003
- Naval Surface Warfare Center Submarine Systems Department Junior Engineer of the Year, 1996
- Naval Surface Warfare Center, Carderock Division, Philadelphia Co-op Engineer of the Year, 1994

#### PROFESSIONAL SOCIETIES AND AFFILIATIONS

##### **Phi Kappa Phi National Honor Society**

##### **Institute of Electrical and Electronics Engineers**

- Member of Technical Committee for Resilience and Security for Industrial Systems
- Member of Controls System, Industrial Engineering Systems, Communication Systems, Robotics and Automation, Computer, and Computational Intelligence Societies
- General Chair for IEEE International Symposium On Resilient Control Systems 2013

##### **American Society of Naval Engineers (ASNE)**

- General Chair for ASNE Intelligent Ships Symposium 2003
- Senior Consultant for ASNE Intelligent Ships Symposium 2005, 2007

VOLUNTEER AND  
PRO BONO WORK

- Industrial Advisory Committee, Temple University Department of Computer Science, (2015 - Present)
- Advisory Panel Member - Idaho National Laboratory Distinctive Signature for Instrumentation, Controls, and Intelligent Systems (2009 - 2013)
- General Chair - IEEE International Symposium on Resilient Control Systems (2013, 2014)
- Member - Haddon Heights Planning Board (2013 - Present)
- Temple University Electrical Engineering Department Advisory Panel (2008 - 2010)

PUBLICATIONS

### Books

**Distributed Control of Heterogeneous Systems**, Dr. Frank Ferrese, ISBN-10:3659237868, Lambert Academic Publishing, 2013

### Journal and Conference Papers

1. **Online Optimal Generation Control Based on Constrained Distributed Gradient Algorithm** Zhang, W., Xu, Y., Liu, W., Liu, L., & Ferrese, F. (2015) Power Systems, IEEE Transactions on, Volume 30, Issue 1
2. **Distributed Subgradient-Based Coordination of Multiple Renewable Generators in a Microgrid** Zhang, W., Xu, Y., Liu, W., Ferrese, F., & Liu, L. (2014) Power Systems, IEEE Transactions on, Volume 29, Issue 1
3. **Distributed Fuzzy Logic Price Negotiation in Market Based Multi-Agent Control** Thibodeau, B., Qiangguo, R., Li Bai, Ferrese, F. Biswas, S., & Dong, Q. (2013) Resilient Control Systems, IEEE Symposium on, 2013
4. **Fully Distributed Coordination of Multiple DFIGs in a Microgrid for Load Sharing** Zhang, W., Xu, Y., Liu, W., Ferrese, F., & Liu, L. (2013) Smart Grid, IEEE Transactions on, Volume 4, Issue 2
5. **Market-based resource allocation for distributed data processing in wireless sensor networks** Zimmerman, Andrew T., Jerome P. Lynch, and Frank T. Ferrese ACM Transactions on Embedded Computing Systems (TECS) 12.3 (2013): 84.
6. **Multiagent-Based Reinforcement Learning for Optimal Reactive Power Dispatch** Xu, Y. and Zhang, W. and Liu, W. and Ferrese, F. Systems, Man, and Cybernetics, Part C: Applications and Reviews, IEEE Transactions on, Volume 42, Number 6, 2012
7. **Resilient consensus control for linear systems in a noisy environment** Biswas, S. and Ferrese, F. and Dong, Q. and Bai, L. American Control Conference (ACC), 2012

8. **Adaptive Neural replication and resilient control despite malicious attacks** Giorgi, S. and Saleheen, F. and Ferrese, F. and Won, C.H. IEEE Resilient Control Systems (ISRCS), 2012 5th International Symposium on 2012
9. **Multiagent-Based Reinforcement Learning for Optimal Reactive Power Dispatch** Xu, Y. and Zhang, W. and Liu, W. and Ferrese, F. Systems, Man, and Cybernetics, Part C: Applications and Reviews, IEEE Transactions on, Volume 42, Number 6, 2012
10. **Resiliency of linear system consensus in the presence of channel noise** Ferrese, F. and Biswas, S. and Dong, Q. and Bai, L. Resilient Control Systems (ISRCS), 2012 5th International Symposium on
11. **Cooperative Federated Control with Application to Tracking Control** Ferrese, F. and Dong, Q. and Bradshaw, K. and Chaves, S. and Biswas, S. and Bai, L. IEEE 13th International Conference on High Performance Computing and Communications (HPCC), 2011
12. **Cooperative Federated Multi-Agent Control of Large-Scale Systems** Dong, Q. and Bradshaw, K. and Ferrese, F. and Bai, L. and Biswas, S. Control and Applications, 2011
13. **Optimal Feedback Control of Power Systems Using Eigenstructure Assignment and Particle Swarm Optimization** Ferrese, F.; Dong, Q.; Biswas, S.; Nataraj, C; Naval Engineering Journal, Volume 123 Number 1, 2011
14. **Design of a Reliable Distributed Secure Database System** Bai, L. and Biswas, S. and Ferrese, F. Networking, Architecture and Storage (NAS), 2010 IEEE Fifth International Conference on
15. **Market Based Computational Task Assignment with Autonomous Wireless Sensor Networks** Zimmerman, A; Lynch, J; Ferrese, F; Proceedings of IEEE 2009 International Conference on Electro/Information Technology
16. **Multi-Agent Based Interoperable Wireless Sensor Network Model** Xiong, Bai, Ferrese; Proceedings of the 2009 IEEE Sensors Conference
17. **Performance Analysis of Mobile Agent Based Wireless Sensor Network** Bai, Ferrese, Ploskina, Biswas; 2009 8th International Conference on Reliability, Maintainability, and Safety
18. **A Control System Test Bed for Demonstration of Distributed Computational Intelligence Applied to Reconfiguring Heterogeneous Systems** Srivastava, S.K.; Cartes, D.A.; Maturana, F.; Ferrese, F.; Pekala, M.; Zink, M.; Meeker, R.; Systems Conference, 2007 1st Annual IEEE 9-13 April 2007 Page(s):1 - 8
19. **Survivability Analysis of Reconfigurable Systems** Bai, Li; Biswas, Saroj; Ortiz, Albert; Ferrese, Frank; Dalessandro, Don; Dong, Qing; Industrial Engineering and Engineering Management, 2007 IEEE International Conference on 2-4 Dec. 2007 Page(s):663 - 667
20. **Anti-Threat Mobile Agent Based Ship Freshwater Cooling System** Lu, Yan; Ferrese, Frank; Labouliere, Mike; ASNE Ship Control Symposium Conference Proceedings, 2007

21. **An Architecture for Shipboard Auxiliary System of Systems Simulation and Testing** Brown, Kevin; Ferrese, Frank; Zink, Mike; Longo, Don; ASNE Ship Control Symposium Conference Proceedings, 2007
22. **Recent Developments In U.S. Navy Navigation Systems** Ferrese, Frank; Naval Forces ISSN 0722-8880 VI 2002
23. **Implementation of Shipboard Data Into Maintenance Decisions** Ferrese, Frank; Savage, Chris; ASNE Intelligent Ships Symposium III Conference Proceedings 1999

INVITED TALKS

1. “Distributed Control using Auction Theory and Optimal Control Theory”, June 26, 2013, Siemens Corporate Research, Princeton, NJ
2. “The Ship as a Microgrid”, September 11, 2014, Government and DoD Smart Grids and Alternative Energy Symposium, Arlington, Va

PATENTS

1. Thermal Management Smart Valve with Rupture Detection and Isolation (US Patent No. US8600566B1)
2. Dynamic Simulation of a System of Interdependent Systems (US Patent No. US8589133B1)