

Mark Louis Homer, Ph.D.
Research Fellow, Harvard Medical School and Boston Children's Hospital
Curriculum Vitae

CONTACT INFO:

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EDUCATION:

6/2014-current	M.M.Sc.	Biomedical Informatics, Harvard Medical School (5/2016 expected graduation) <i>Predicting falls of people over 65 from insurance claims</i>
6/2009-5/2014	Ph.D. Ph.D. Thesis:	Biomedical Engineering, Brown University <i>Novel algorithms for better decoding of neural signals for intracortical brain computer interfaces</i>
9/1990-5/1995	B.S and M.S. M.S Thesis:	Mech. Eng., Massachusetts Institute of Technology (GPA: 4.8/5.0) <i>A parametric model for reducing the manufacturing cost of the traveling wave tube</i>

PROFESSIONAL EXPERIENCE:

6/2014-current	Biomedical Informatics Research Training Fellow	Department of Biomedical Informatics, Harvard Medical School (Supported by the National Library of Medicine)
6/2014-current	Research Fellow	Computational Health Informatics Program, Boston Children's Hospital
6/2009-5/2014	Graduate Research Assistant	BrainGate Research Team, Brown University
2/2006-5/2009	Technical Director and Project Leader	C.S. Draper Laboratory
5/2005-1/2006	Engineering Group Manager	BAE Systems, Advanced Information Technologies
1/2000-4/2005	Sr. Member of Technical Staff	C.S. Draper Laboratory
4/1998-12/1999	Process & Controls Engineer	Biogen
9/1996-4/1998	Operations Analyst	Biogen
6/1995-9/1996	Decision Support Analyst	Alphatech

PUBLICATIONS:

Homer ML, Palmer NP, Bodenreider O, Cami A, Chadwick L, Mandl KD, "The Drug Data to Knowledge Pipeline: Large-Scale Claims Data Classification for Pharmacologic Insight," 2016 AMIA Joint Summits. (submitted)

Homer ML, Harrison MT, Black MJ, Hochberg LR, "A Nonlinear Hierarchical Decoder for Intracortical Brain Computer Interfaces," Journal of Neural Engineering. (submitted)

Homer ML, Perge JA, Black MJ, Harrison MT, Cash SS, Hochberg LR, "Adaptive Offset Correction for Intracortical Brain Computer Interfaces," IEEE Transactions on Neural Systems and Rehabilitation Engineering, vol. 22, 2014.

Perge JA, Zhang S, Malik WQ, **Homer ML**, Cash SS, Friehs G, Eskandar EN, Donoghue JP, Hochberg LR, "Reliability of Directional Information in Unsorted Spikes and Local Field Potentials Recorded in Human Motor Cortex," Journal of Neural Engineering, vol. 11, no. 4, 2014.

Homer ML, Harrison MT, Black MJ, Perge JA, Cash SS, Friehs G, Hochberg LR, "Mixing Decoded Cursor Velocity and Position from an Offline Kalman Filter Improves Cursor Control in People with Tetraplegia," Proceedings of 6th International IEEE EMBS Conference on Neural Engineering, 2013.

Homer ML, Nurmikko AV, Donoghue JP, Hochberg LR, "Sensors and Decoding for Intracortical Brain Computer Interfaces," Annual Review of Biomedical Engineering, vol. 15, 2013.

Perge JA, **Homer ML**, Malik WQ, Friehs G, Donoghue JP, Hochberg LR, "Intra-day Signal Instabilities Affect Decoding Performance in an Intracortical Neural Interface System," Journal of Neural Engineering, vol. 10, no. 3, 2013.

Homer ML, Irvine JM, Wendelken S, "A Model-Based Approach to Human Identification Using ECG," Proceedings of SPIE, Optics & Photonics in Global Homeland Security V and Biometric Technology for Human Identification VI, 2009.

Homer ML, Lim S, Lopez J, Corbett M, "Machine-Aided Design of an Air Launched Missile Defense System," Proceedings of AIAA Missile Sciences Conference, 2008.

Forest F, Kessler L, **Homer ML**, "Design of a Human-Interactive Autonomous Flight Manager (AFM) for Crewed Lunar Landing," Proceedings of Infotech@Aerospace, 2007.

Pettit R, **Homer ML**, "An Autonomous Threat Evasion Response Algorithm for Unmanned Air Vehicles During Low Altitude Flight," Proceedings of AIAA 1st Intelligent Systems Technical Conference, 2004.

Homer ML, "A Quantitative Approach for Determining the Level and Sophistication of Automation in Unmanned Vehicles," Proceedings of the AUVSI, 2003.

Homer ML, "Handling Event Driven Messaging in Distributed Flight Critical Systems," Proceedings of the Digital Avionics Systems Conference, 2002.

Bertsekas DP, **Homer ML**, Logan DA, Patek SD, Sandell NR, "Missile Defense and Interceptor Allocation by Neuro- Dynamic Programming," IEEE Transactions on Systems, Man and Cybernetics, Part A, Vol. 30 Issue: 1, 2000.

PRESENTATIONS:

Homer ML, Harrison MT, Perge JA, Simeral JD, Hochberg LR, "Decoding of Target Proximity Improves Estimation of Attempted Movement in People with Tetraplegia," Society for Neuroscience Annual Meeting, 2013.

Homer ML, Perge JA, Harrison MT, Black MJ, Hochberg LR, "A Method for Determining Neural Signal Contributions to Kalman Filter Based Decoding in Intracortical Brain Computer Interfaces," BMES Annual Meeting, 2012.

Homer ML, Perge JA, Harrison MT, Black MJ, Hochberg LR, "Characterizing Neural Signal Nonstationarities During Operation of an Intracortical Brain Computer Interface by People with Tetraplegia," Society for Neuroscience Annual Meeting, 2012.

Homer ML, Perge JA, Harrison MT, Black MJ, Hochberg LR, "Detecting Neural Signal Nonstationarities in Intracortical Brain Computer Interfaces Using a Model Selection Method," Sixth International Workshop on Statistical Analysis of Neuronal Data, 2012.

Homer ML, Perge JA, Hochberg LR, "Mitigating Nonstationarities During Neural Cursor Control with Noise Offset Correction," Society for Neuroscience Annual Meeting, 2011.

Parry J, **Homer ML**, Openshaw G, "Autonomy: How Much is Right for Future Commercial Applications?," UUVS, 2003.

AWARDS:

6/2014 National Library of Medicine's Biomedical Informatics Research Training Fellowship

2/2009 Levi Fellowship

3/2008 Top paper in Draper Technology Digest

11/2007 Selected to serve on company-wide innovation committee at Draper Laboratory

10/2004 Best paper in session at AIAA 1st Intelligent Systems Technical Conference

7/2004 Team recognized as top Lockheed Martin contractor

SKILLS:

Management: personnel, algorithm & software projects, supply chains, production equipment design & delivery

Algorithms: machine learning, artificial intelligence, data mining, signal processing, operations research, optimization, vehicle guidance/trajectory/mission planning, bioprocess control systems

Software: SQL, R, JAVA, MATLAB, C/C++, embedded C, industrial control systems (PLCs & SCADAs)

Design: electronic health records & insurance claims, intracortical brain computer interfaces, ECG and other noninvasive sensors, Mars landers, unmanned rotorcraft, bioreactors, supply chains

TEACHING/TRAINING/REVIEWING:

10/2015-10/2015	Reviewer for American Medical Informatics Association's Joint Summits on Translational Science
3/2015-8/2015	Undergraduate Research Supervisor for Pedro Moreira Neto, Boston Children's Hospital Project: An Association Study Between Medications and Falls
8/2015-8/2015	Reviewer for IEEE Transactions on Biomedical Engineering
4/2015-4/2015	Reviewer for American Medical Informatics Association's Annual Symposium
2/2015-5/2015	Guest Speaker for Clinical Informatics course, Harvard Medical School
2/2014-6/2014	Undergraduate Research Supervisor for Daniel Milstein, Brown University Project: Errant Unit Detection for Intra-Cortical Brain Machine Interfaces
12/2013-12/2013	Guest Speaker for Introduction to Engineering Course, Brown University
11/2013-11/2013	Invited Speaker to Applied Mathematics Graduate Student Seminar, Brown University
5/2012-5/2012	Undergraduate Honors Thesis Reader for Katheryn Tringale, Brown University Thesis: Towards the Optimal Design of an Assistive Communication Interface
4/2012-4/2012	Invited speaker to Biomedical Engineering Club, The Wheeler School
2/2011-5/2011	Teaching Assistant for Tissue Engineering Course, Brown University
11/2005-11/2005	Head Instructor and Organizer, Customer Tutorial, BAE Systems
7/2004-5/2005	Master's Thesis Supervisor for Mark M. Hickie, Massachusetts Institute of Technology Thesis: Behavioral Representation of Military Tactics for Single-Vehicle Autonomous Rotorcraft via Statecharts
7/2003-5/2004	Master's Thesis Supervisor for Ryan L. Pettit, Massachusetts Institute of Technology Thesis: Low Altitude Threat Evasive Trajectory Generation for Autonomous Aerial Vehicles

SELECTED INDUSTRY ACTIVITIES:

7/2008-5/2009	Principle Investigator exploring ways for people to guide unsupervised machine learning
3/2008-5/2009	Lead developer of pattern classification software that discerns an individual's arousal state from physiological sensors. Project sponsored by the Department of Homeland Security.
6/2007-7/2008	Co-researcher on computer network intrusion detection software.
7/2007-12/2007	Technical Director of a study that explored design alternatives for the Missile Defense Agency's air launched, hit-to-kill interceptor.
10/2007-3/2007	Designed an activity scheduling routine for an autonomous micro-satellite sponsored by the Air Force Research Laboratory.
9/2006-1/2007	Formulated a trajectory planner for NASA's Autonomous Landing and Hazard Avoidance Technology (ALHAT) program.

2/2006-1/2007	Developed a rapid path planner for an unmanned undersea vehicle for the Navy.
11/2005-11/2005	Organized and led multi-day long training seminar for Boeing developers on the systems integration of battle management software for aerial drones.
5/2005-1/2006	Personnel manager of five engineering staff members, directly responsible for hiring, work schedules, career guidance, performance reviews, and yearly incentive packages.
5/2005-1/2006	Oversaw system engineering activities during the development of battle management software for an unmanned air vehicle under the J-UCAS program sponsored by DARPA.
2/2003-5/2005	Led team to prototype command & control software for an autonomous helicopter. Effort sponsored by DARPA & the Army.
1/2002-2/2004	Evaluated the mission effectiveness of different autonomous helicopter software architectures.
10/2001-5/2002	Developed a prototype distributed avionics architecture including an embedded operating system and voting logic to achieve fault tolerance.
4/1998-12/1999	Managed the specification/ construction of pharmaceutical production equipment. Worked with contractors and production personnel to meet cost, time, and quality targets.
4/1998-12/1999	Developed software for Biogen's manufacturing systems. Worked with closed-loop control techniques, data acquisition, PLC's, and related hardware.
9/1996-4/1998	Formulated a strategy for senior management to minimize Biogen's risk of a product recall. Results implemented by CEO and his operating team.
9/1996-4/1998	Ran Biogen's supply chain schedule using a custom developed software tool. Coordinated manufacturing and quality activities of Avonex® and four other pharmaceutical products.
6/1995-9/1996	Constructed software using genetic algorithms and dynamic programming that positions and schedules missile defense and radar resources.
6/1995-9/1996	Used linear programming for crisis management of supply chains.

INDUSTRY FUNDING AWARDS:

7/2008-5/2009	Led internal research and development grant by Draper Laboratory for enabling a person to guide an unsupervised machine learning algorithm.
11/2005-1/2006	Co-led ~\$4M proposal selected by the Army for mission planning and routing of drone aircraft.
10/2004-1/2005	On proposal team that won subcontract by Lockheed Martin for threat evasion software to fly on an autonomous helicopter.
7/2004-6/2005	Led internal research and development grant by Draper Laboratory for a general software architecture for automating unmanned vehicles.
7/2002-6/2003	Led internal research and development grant by Draper Laboratory for choosing an unmanned vehicle's level of autonomy.

OTHER INTERESTS:

Practicing 7th degree black belt in Kenpo Karate & Taiho-Jitsu, teaching children and adults

Active sailor with ASA 101 (Basic Keelboat Sailing) Certification

Skiing, hiking, meditation, and travel