David M. Bevly

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Department of Mechanical Engineering
Auburn University
Auburn, AL 36849-5341

Current Position

Auburn University — **Auburn, AL**
McNair Endowed Professor, Department of Mechanical Engineering — *2011-present*
Associate Professor, Department of Mechanical Engineering — *2007-2011*
Assistant Professor, Department of Mechanical Engineering — *2001-2007*
In charge of teaching mechanical engineering courses and developing a strong externally funded research program in the area of dynamics, controls, and transportation systems.

Education

Stanford University — **Stanford, CA**
Ph.D., Mechanical Engineering, September 2001. Thesis directed by Professor Bradford Parkinson entitled "High Speed, Dead Reckoning, and Towed Implement Control for Automatically Steered Farm Tractors Using GPS."
Major Area: Automatic Control, Minor Area: Mechatronic Systems

Massachusetts Institute of Technology — **Cambridge, MA**
Master of Science, Mechanical Engineering, September 1997. Thesis directed by Professor Steven Dubowsky, entitled "Action Module Planning and Cartesian Based Control of an Experimental Climbing Robot."

Texas A&M University — **College Station, TX**
Bachelor of Science, Mechanical Engineering, Summa Cum Laude, May 1995. Broad curriculum in mechanical engineering with emphasis in design, dynamics, and control. Completed undergraduate research units directed by Professor Christian Burger.

Awards

2010 - William Walker Teaching Award
2007 - SAE Ralph R. Teetor Educational Award
2005, 2008, 2010 - Outstanding Mechanical Engineering Faculty Member Award
2006 - Office of Naval Research Young Investigator Award
2006 - Army Research Office Young Investigator Award
2004 - Auburn Engineering Research Award (Junior Level)
2000 - SAE Myers Award for Outstanding Student Paper

Research Background

GPS Lab, Stanford — **Stanford, CA**
Graduate Researcher — *1998-2001*
Performed research and implementation of hardware for automated control of a farm tractor.

DYNAMIC Design Lab, Stanford — **Stanford, CA**
Graduate Researcher — *1999-2001*
Initiated ideas and performed research on the use of GPS to estimate vehicle sideslip for ESC.

Veteran Affairs Hospital — **Palo Alto, CA**
Rehabilitation R&D Department — *1998 – 2000*
Developed an impedance based control architecture for use in rehabilitating patients.

Field and Space Robotics Laboratory, MIT — **Cambridge, MA**
Graduate Researcher — *1995-1997*
Performed research and experimentation of planning and control techniques on a climbing robot.

Professional Memberships

American Society of Mechanical Engineers (ASME)
Association of Unmanned Vehicle Systems International
Institute of Navigation
Society of Automotive Engineers

Summary Metrics

Research Funding: $20M ($15M as PI)
PhD Students Advised: 10 Graduated, 6 Current
MS Students Advised: 35 Graduated, 12 Current
Undergraduate Research Students: 42 Graduated, 5 Current

Books: 1
Book Chapters: 3
Journal Publications: 34
Conference Publications: 98

Selected Publications

Books (1)

1. David M. Bevly and Steward Cobb, *GNSS For Vehicle Control*, Artech, 2010.

Book Chapters (3)

1. David M. Bevly, Demoz Gebre-Egziabher, Mark Petovello, "Integration of GNSS and INS: Part 1" in *GNSS Applications and Methods*, Artech, 2009.
2. David M. Bevly, Demoz Gebre-Egziabher, Mark Petovello, "Integration of GNSS and INS: Part 2" in *GNSS Applications and Methods*, Artech, 2009.
3. Bevly, D. M., Gebre-Egziabher, D., and Parkinson, B. W., "Error Analysis of a Dead Reckoning Navigator for Ground Vehicle Guidance and Control," selected to be published in the new *GPS Red Book.*

Journal Publications (Selected from Total of 34)

1. Martin, S. , Bevly, D. M., " Comparison of GPS-based autonomous vehicle following using global and relative positioning," *International Journal of Autonomous Vehicle Systems*, Vol. 10, No. 3, 2012 pp. 229-255.
2. Dawkins, J. J., Bevly, D. M, and Jackson, R .L., "Evaluation of fractal terrain model for vehicle dynamic simulations," *Journal of Terramechanics*, Vol. 49, No. 6, 2012, pp. 299-307.
3. Miller, J., Bevly D. M., Flowers, G., "A System for Tracking an Autonomously Controlled Canine, *The Journal of Navigation*, Vol. 64, No. 3, July 2012, pp 427-444.
4. Huang, W. and Bevly, D. M. "Set terrain based optimal speed limits for heavy trucks energy saving', *International Journal of. Powertrains*, Vol. 1, No. 4, 2012, pp. 335-350.
5. Dawkins, J. J., Bevly, D. M, and Jackson, R. L. "Fractal Terrain Generation for Vehicle Simulation", *International Journal of Vehicle Autonomous Systems*, Vol. 10, No. 1/2, 2012, pp. 3-18.
6. Travis, W., Martin, S., Bevly, D. M. "Automated Short Distance Vehicle Following Using a Dynamic Base RTK System." *International Journal of Vehicle Autonomous Systems*, Vol. 9, No. 1/2, pp. 126-141, 2011.
7. Huang, W., and D. M. Bevly, "Evaluation of 3D road geometry based heavy truck fuel optimization," *International Journal of Vehicle Autonomous Systems*, Vol. 8, No. 1, pp. 39-55, 2010.
8. Anderson, R., and Bevly, D. M., "Using GPS with a Model Based Estimator to Estimate Critical Vehicle States," *Journal of Vehicle System Dynamics*, Vol. 48, No. 12, pp. 1413-1438, 2010.
9. M. Lashley, D. M. Bevly, and J. Y. Hung, "Performance analysis of vector tracking algorithms for weak GPS signals in high dynamics," *IEEE Journal of Selected Topics in Signal Processing*, Vol. 3, No.4, pp. 661-673, 2009.
10. Clanton, J., Bevly, D. M., Hodel, S., "A Low Cost Solution for an Integrated, Multi-Sensor Lane Departure Warning System," *IEEE Transaction on Intelligent Transportation Systems*, Vol. 10, No. 1, pp. 47-59, 2009.
11. Daily, R., Travis, W., and Bevly, D. M, "Cascaded Estimators to Improve Lateral Vehicle State and Tire Parameter Estimates," *International Journal of Vehicle Autonomous Systems*, Volume 5, Number 3-4, 2007, pp. 230-255.
12. Bevly, D.M. and Parkinson, B. W., "Cascaded Kalman Filters for Accurate Estimation of Multiple Biases, Dead-Reckoning Navigation, and Full State Feedback Control of Ground Vehicles," *IEEE Journal of Control Systems Technology*, Vol. 15, No. 2, 2007.
13. Travis, W. and Bevly, D. M., " Compensation of Vehicle Dynamic Induced Navigation Errors with Dual Antenna GPS Attitude Measurements," accepted to the *International Journal of Measurement, Identification, and Control*, Vol., No. 3, pp.212-224, 2007.
14. Daily, R., Travis, W., Bevly, D. M., et. al., "SciAutonics-Auburn Engineering's Low-Cost, High-Speed ATV for the 2005 DARPA Grand Challenge," *International Journal of Field Robotics*, Vol. 23, No. 8, pp. 579-597, 2006.
15. Bevly, D. M., Ryu, J., Gerdes, J. C, "Integrating INS Sensors with GPS Velocity Measurements for Continuous Estimation of Vehicle Side-Slip and Tire Cornering Stiffness," *IEEE Transactions on Intelligent Transportation Systems*, Vol. 7, No. 4, pp. 483-493, 2006.
16. Daily, R., Bevly, D. M., "The Use of GPS for Vehicle Stability Control Systems," *IEEE Transactions on Industrial Electronics*, Vol. 51, No. 2, pp. 270-277, 2004.
17. Bevly, D. M., "GPS: A Low Cost Velocity Sensor for Correcting Inertial Sensor Errors on Ground Vehicles," *Journal of Dynamic Systems, Measurement, and Control*, Vol. 126, No. 2, pp. 255-264, 2004.
18. Bevly, D. M., Rekow, A., Parkinson, B., "Comparison of an INS vs. Carrier Phase DGPS Attitude in the Control of Off-Road Vehicles," *Journal of Navigation*, Vol. 42, No. 4, 2000.

Conference Proceedings (Selected from Total of 98)

1. Salmon, J., Bevly, D. M., Hung, J. Y., "Guidance of a Robotic Off-Road Tractor-Trailer System using Model Predictive Control," *Proceedings of the 2013 ASME DSC Conference*, Stanford, CA, October 2013.
2. Wang, Y., Bevly, D. M., Robust Observer Design for Lipschitz Nonlinear systems with parametric uncertainty. *Proceedings of the 2013 ASME DSC Conference*, Stanford, CA, October 2013.
3. Broshears, E., Martin, S., Bevly, D. M., "Ultra-wideband Radio Aided Carrier Phase Ambiguity Resolution in Real-Time Kinematic GPS Relative Positioning," *Proceedings of the Institute of Navigation GNSS Conference*, Nashville, TN, 2013
4. Cofield, R., Martin, S., Bevly, D. M., "An On-Line Visual Driver Aid for Safe and Precise Convoy Following in Visibility-Impaired Conditions," *Proceedings of the Institute of Navigation GNSS Conference*, Nashville, TN, 2013
5. Britt, J. H., Bevly, D. M., "Sensor Auto-Calibration on Dynamic Platforms in 3D", *Proceedings of the Institute of Navigation GNSS Conference*, Nashville, TN, 2013.

Patents (3)

1. GPS Control of a Tractor Towed Implement (Patent No. US 6,434,462).
2. Determination and Control of Vehicle Sideslip Using GPS (Patent No. US 6,681,180).
3. Method and Apparatus for Vehicle Control, Navigation, and Positioning (Patent No. US 6,732,024).

Research Contracts and Grants (Selected from 64 External Awards, $15M)

1. Bevly (PI/PD), Murray, Turochy, Sesek, Shelton, Lim, "Heavy Truck Cooperative Adaptive Cruise Control: Evaluation, Testing & Stakeholder Engagement," $1M ($999,850), FHWA, 9/19/13-9/18/16.
2. Bevly (PI/PD), "Network Assisted Navigation," CERDEC, $1.22M, 10/1/2012-12/31/2014.
3. Bevly (PI/PD), "Vehicle Spacing Determination & Display in Low Visibility Conditions," IS4S (through Army SBIR), $330K, 5/1/13-4/30/16.
4. Bevly (PI/PD), Sesek, Evans, "Extended Event Horizon Navigation & Wayfinding For Blind & Visually Impaired Pedestrians In Unstructured Environments, FHWA, $150K, 3/29/13-1/19/14.
5. Bevly (PI/PD), "Development of Enhanced GPS Signal Processing for Weak Signals," John Deere/Navcom, $150K, 11/1/2012-10/30/2014.
6. Bevly (PI/PD), "Stability Control Improvement &State Detection For Autonomous Vehicles," Autonomous Solutions Incorporated (through Army SBIR), $445K, 12/1/2012-6/30/2016.
7. Bevly, (PI), Mao (Co-PI), Lim (Co-PI), "Network Assisted GPS", $260K, 8/1/2010-8/31/2012, subcontract from IS4S
8. Hung, J. (PI), Bevly (Co-PI), "Navigation and Control of Towed Instrumentation," $1,336,587, ARMY Corp of Engineers, 3/24/06-6/1/12
9. Bevly (PI/PD), "Next Generation Vehicle Positioning Techniques in GPS-Degraded Environments for Vehicle Safety and Automation Systems," FHWA, $650K from 9/1/2009-8/31/2011
10. Bevly (PI/PD) "Analysis of Dual Frequency DRTK and ANS Vehicle Model Development, $125K, General Dynamic Robotic Systems, 1/1/2010-12/31/2010.
11. Bevly (PI/PD), Jackson, R. (Co-PI), "Navigation and Modeling Algorithms for FCS Convoys," US Army TARDEC, $540K from 3/1/2008-2/28/2010
12. Bevly (PI/PD), "Intelligent Multi-Sensor Measurements to Enhance Vehicle Navigation and Safety Systems," FHWA, $320K from 9/1/2007-8/31/2009
13. Bevly (PI/PD), "On-line System Identification for Control of Unmanned Ground Vehicles," Army Research Office Young Investigator Award, $150K, 8/1/06-8/31/09.
14. Bevly (PI/PD), "Autonomous Navigation and Control of a K-9," Office of Naval Research Young Investigator Award, $300K, 5/1/06-5/31/09.
15. Bevly (PI/PD), "Relative Navigation and Control of Truck Convoys for FCS," SAIC, $350K, 1/1/06-1/31/08.
16. Bevly (PI/PD), "High-Speed Tele-operation and Navigation of UGVs in Harsh Environments," U.S. Army Aviation and Missile Research Development Engineering Center, $100K, 4/1/05-4/30/06.
17. Bevly (PI/PD), "Identification of Model Variations and Adaptive Control of Automatically Steered Farm Tractors Using GPS," John Deere and Company, $250K, 2/15/03-12/31/07.

Professional Society Service (Selected from 12)

1. Associate Editor, *International Journal of Autonomous Vehicle Systems* (2009-present)
2. Associate Editor, ASME Dynamic Systems and Control Conference (2009 and 2010)