



William Emfinger

EDUCATION

- 2011-2015 **Ph.D.**, *Vanderbilt University*, Nashville, TN., 3.91.
Electrical Engineering
- 2007-2011 **B.E.**, *Vanderbilt University*, Nashville, TN., 3.66 (*Electrical*), 3.48 (*Biomedical*), 3.35 (*Cumulative*).
Biomedical Engineering and Electrical Engineering

PhD Dissertation

- Title *Network Performance Analysis and Management for Cyber-Physical Systems and their Applications*
- Description Techniques for precise design-time analysis and run-time management of time-varying network resources in distributed CPS using min-plus calculus and convolution.

RELEVANT SKILLS

- Languages C/C++, C#, CUDA, HLSL, Python, Javascript/Node.js, Assembly
- Software MATLAB, DirectX, OpenGL, EAGLE, LTSPICE, LaTeX, Component-Based Software, Code Generation
- OSes Windows, Linux, FreeRTOS, uC/OS-II & III
- Hardware ARM (ARM7, STM32, Cortex-M3), AVR (Mega, Tiny, USB) TI (MSP, OMAP)
- Math Rendering, Simulation, Image Processing, Motion Processing

EXPERIENCE

- 2017–Present **Chief Technology Officer**, *Max Mobility LLC.*, Antioch, TN.
- Developing and coordinating R&D roadmaps and research proposals
 - Developing novel propulsion methods, devices
 - Developing and leveraging a model-based engineering and hardware-in-the-loop design and testing framework.
 - Machine learning for analysis of big data gathered from products in the field.
- 2016–Present **Adjunct Assistant Professor of Mechanical Engineering**, *Vanderbilt University*, Nashville, TN.
- Faculty advisor to the Vanderbilt Aerospace Design Lab, focusing on systems engineering, physical dynamics modeling and control, model-based engineering, and ground-based hardware in the loop test equipment.
 - Small satellite engineering and rocket-based in-flight control systems
- 2016–2017 **R&D Engineer**, *Max Mobility LLC.*, Antioch, TN.
- Coordinated software design, modeling, development, testing, and production for SmartDrive MX2+ and the PushTracker smartwatch. Included wireless reprogramming, inertial measurement, motor control, power management and display code.
 - Developed and integrated collaborative, model-based software engineering into R&D team workflow.
 - Developed modeling language and code generators which produced target-executable code.
- 2015–2016 **Post-Doctoral Researcher**, *Vanderbilt University*, Nashville, TN.
- Developed Hardware-in-the-Loop testbed (RCPS) and integrated it with distributed coordinated simulation platforms for testing and validation of resilience and security in distributed CPS.
 - Integrated ROSMOD toolsuite into web-based, collaborative modeling platform (WebGME) to become integrated development environment for developing, deploying, and managing distributed CPS applications on RCPS testbed.
 - Developed power-system modeling toolsuite with simulation backend for testing transactive energy systems and their designs (using Gridlab-D)
- 2011–2015 **Graduate Research Assistant**, *Vanderbilt University*, Nashville, TN.
- Developed component model for Robot Operating System (ROS), with associated graphical model-driven development, analysis, deployment, and monitoring tool, ROSMOD
 - Developed new methods for design-time network analysis and run-time network enforcement of applications in distributed systems with time-varying networks
 - Worked on Fractionated Satellite Project helping develop secure OS, Middleware, Analysis techniques, and Development & Deployment infrastructure.
 - Published and presented research in RTSS@Work 2013 workshop, RTAS CyPhy 2014 Workshop, ISORC 2015, and RSP 2015

520 Tall Trees Lane – Nashville, TN – 37209

☎ +1 (615) 477 3384 • ✉ waemfinger@gmail.com • in emfinger • 🌐 finger563

- 2009-2011 **Senior Electrical Engineer**, *Max Mobility LLC.*, Antioch, TN.
- Worked 50+ hr/wk during summer, 30+ hr/wk **during school** while taking 18 hours of undergraduate classes
 - Developed algorithms to classify IMU & propulsion data from Max Mobility's BioMobility Lab
 - Designed, fabricated, and programmed IMU to detect pushes on manual wheelchair, *PushTracker*
 - Transitioned *PushTracker* into autonomous power assist device for manual wheelchairs, *SmartDrive*

AWARDS

- 2016 **AIAA Special Award.**
Outstanding mentorship of the 2014-2015 Vanderbilt Student Launch Team
- 2015 **First Place NASA Student Launch Challenge.**
Martian sample recovery system: **Autonomous Ground Support Equipment**
- 2014 **First Place NASA Student Launch Challenge.**
StarCRAFT (rocket + ramjet + landing-site hazard detection) System
- 2011 **RESNA Student Design Competition Finalist (Highest award).**
PushTracker activity monitor and feedback for manual wheelchair users

PROJECTS

- 2014-Present **ROSMOD**, *Resarch Project.*
Collaborative toolsuite for developing, analyzing, deploying, and monitoring component-based ROS applications on distributed systems. Used to win NASA competition in 2015. Available at rosmod.rcps.isis.vanderbilt.edu.
- 2013-2015 **Vanderbilt Aerospace Design Lab**, *Club Project.*
- (2013-2014) design and implement the landing-site hazard detection system for the *StarCRAFT* rocket: system design, image processing, data transmission and collection
 - (2014-2015) design and implement the autonomous Martian sample detection and recovery system: system design, PCB design and manufacturing, ROSMOD component code, image processing.
- 2014-Present **Multi-Domain Systems Simulation and Rendering Engine**, *Personal Project.*
Goal: simulate in real-time multiple interacting physical systems at multiple scales using cutting edge GPU and GPGPU computing techniques, focusing on aerospace craft in the solar system and planetary atmospheres.
- 2013 **Software Rendering Engine**, *Class Project.*
Networked first person video game utilizing a custom software rendering engine that I designed and implemented.
- 2010 **Wearable Transparent HUD**, *Class Project.*
Developed transparent wearable HUD showing user's position/orientation and direction/distance to goal location.

Publications

- [1] D. Balasubramanian, W. Emfinger, P.S. Kumar, W. Otte, A. Dubey, and G. Karsai. An application development and deployment platform for satellite clusters, 2013.
- [2] A. Dubey, W. Emfinger, A. Gokhale, G. Karsai, W. R. Otte, J. Parsons, C. Szabo, A. Coglio, E. Smith, and P. Bose. A software platform for fractionated spacecraft, 2012.
- [3] W. Emfinger and G. Karsai. Modeling network medium access protocols for network quality of service analysis, 2015.
- [4] W. Emfinger and G. Karsai. Analysis of routed networks with time-varying delays and capacities, 2016.
- [5] W. Emfinger, G. Karsai, A. Dubey, and A. Gokhale. Analysis, verification, and management toolsuite for cyber-physical applications on time-varying networks, 2014.
- [6] W. Emfinger, P.S. Kumar, A. Dubey, W. Otte, A. Gokhale, and G. Karsai. Dremis: A toolchain and platform for the rapid application development, integration and deployment of managed distributed real-time embedded systems, 2013.
- [7] P.S. Kumar, W. Emfinger, and G. Karsai. A testbed to simulate and analyze resilient cyber-physical systems, 2015.
- [8] P.S. Kumar, W. Emfinger, G. Karsai, D. Watkins, B. Gasser, and A. Anilkumar. Rosmod: A toolsuite for modeling, generating, deploying, and managing distributed real-time component-based software using ros, 2016.
- [9] T. Levendovszky, A. Dubey, W. Otte, D. Balasubramanian, A. Coglio, S. Nyako, W. Emfinger, P. Kumar, A. Gokhale, and G. Karsai. Distributed real-time managed systems: A model-driven distributed secure information architecture platform for managed embedded systems, 2014.