

# Jonathan Mash

## contact

15 Windfield Cres  
Kingston, ON, K7K 6G3  
Canada

+1 (613)-329-0825

me@jonmash.ca ✉  
jonmash.ca 🔗  
jonmash 🌐

## education

### Queen's University

2009 – 2013

**M.Sc.** in Electrical Eng.  
*Queen's Centre for  
Energy and Power  
Electronics Research*  
Thesis: Advanced  
Nonlinear Control  
Techniques for Wind  
Energy Conversions  
Systems  
Course Avg: 92%

2004 – 2009

**B.Sc.** in Electrical Eng.  
*2<sup>nd</sup>/45 in Elec. Eng.  
5<sup>th</sup>/576 in Eng.*  
Final Year Avg: 93%

## programming

★Node.JS, Python, PHP  
Javascript, HTML5,  
CSS3, C/C++, C#,  
TCP/IP, HTTP, Zigbee,  
MySQL, CouchDB,  
RTOS, ★Linux,  
Windows, ★Git,

## design tools

★Altium, Matlab, PSIM,  
★Notepad++, Keil, IAR,  
Sketchup, Eclipse,  
Visual Studio, ★GitHub

## interests

electronics, robotics,  
★multi-rotors, drones,  
solar power systems,  
★micro-controllers,  
single-board  
computers, IoT,  
★embedded systems,  
linux, 3d printing

## skills

**core:** problem solving, project management, product development, effective communication.  
**electronics:** system design, embedded systems, prototyping, manufacturing.  
**hardware:** specifications, pcb design, assembly & rework, testing & debugging, production.  
**software:** specifications, design, programming, testing, deployment.

## experience

2010 **SPARQ Systems**

Kingston, Ontario, Canada

▼ *Lead Product Developer*

- present*
- Given complete control over the design and implementation of an all-new monitoring platform developed using all new microinverter technology.
  - Developed an in-home **embedded Linux** device utilizing advanced **Zigbee** communication, USB, 802.11 **WiFi**, and a **Websocket** API to connect to cloud servers.
  - Built an Amazon **Cloud** based monitoring and control solution based on **Node.JS**, CouchDB **NoSQL** database, and a modern **HTML5** web front end.
  - Actively involved in high-level market research, feature requirements derivation, and product requirements specifications.
  - Component selection, **PCB** design, aided mechanical design, produced & tested **prototypes**, and oversaw the entire process from **design** through to **manufacturing**.
  - Led and supported the deployment of field trials at sites across North America.
  - Recruited and trained new employees to grow the group from just myself to a team of over six highly talented developers and engineers.
  - Coordinated multiple teams and external contractors working on key projects.

*Product Developer*

- Designed, prototyped, and manufactured an in-home embedded device for solar panel and inverter monitoring.
- Developed a novel Power Line Communication protocol using Forward Error Correcting codes for robust communication the microinverters.
- Developed the manufacturing, assembly, and testing procedures to ensure only high quality products are delivered to customers.
- Trusted by senior management to provide independent engineering support to customers due to in-depth knowledge of the entire product line.

2009 **Centre for Energy and Power Electronics Research**

Kingston, Ontario, Canada

▼ *Engineering Research Assistant*

- 2013
- Researched and designed a medium-power front-end converter for telecommunications equipment using simulation tools.
  - Developed a wind turbine emulator using an induction motor connected to a permanent magnet synchronous generator for use in research activities.
  - Derived novel non-linear control schemes for a PMSG-connected wind turbine.

2008 **Ontario Power Generation**

Pickering, Ontario, Canada

*Student - Computers and Controls Division*

- Developed and deployed an online portal to aid in knowledge retention.
- Identified project requirements, researched possible solutions, and implemented the chosen solution: Microsoft's Sharepoint and custom workflows.

2004 **Queen's University Solar Vehicle Team**

Kingston, Ontario, Canada

▼ *Project Manager*

2008 Competitions: **Panasonic World Solar Challenge & North American Solar Challenge**

- Oversaw all aspects of a semi-professional racing team.
- Supervised the design, fabrication and testing of the vehicle.
- Directed efforts in marketing, sponsorship, event planning, and PR.
- Managed all financial planning, purchasing, cash flow, and budgeting.
- Led fund-raising efforts, raising over \$500,000 in cash and in-kind donations.
- Knowledge of all vehicle design including electrical, mechanical, and software.
- Team's expert on power systems, lithium-based batteries, and solar cells.

## other experience

- 2007 **Faculty of Applied Science** Kingston, Ontario, Canada  
✓ *Senior Teaching Assistant*
- 2011 **Project Manager** - Managed and taught six teams of four students the process of design, implementation, and prototyping in a team environment.  
**Lab Manager** - Facilitated hardware and software labs in four undergraduate ECE courses. Assisted in the development and execution of a new robotics project-based course for second year ECE students.

## select courses

- 2008 **Fundamentals of Power Electronics: Power Electronics I & II, Power Electronics (M.Sc.), Switching Power Converters (M.Sc.), Power System Design (M.Sc.), Electro-Magnetic Compatibility (M.Sc.)**  
✓
- 2010 Queen's University & Royal Military College of Canada  
Switching devices, switching converters (AC-to-DC, DC-to-DC, DC-to-AC), loss-less switching (zero-voltage switching, zero-current switching) resonant converters, soft-switching converters. Variable frequency control, phase-shift and hybrid control. Small signal models, large signal models, peak current mode and average current mode control, system stability issues, digital control techniques, fuzzy logic control, sliding mode control, and non-linear control strategies. Electro-magnetic interference, EM compatibility, crosstalk, HF circuits.
- 2008 **Robotics and Control: Introduction to Robotics, Control Systems (4th Year), Control of Mobile Robotics (2013)**  
✓
- 2013 Queen's University & Coursera  
Rigid body kinematics, manipulator kinematics, workspace, singularity, redundancy, manipulator dynamics, and trajectory generation. Herd navigation and cooperation, aerial multirotor control with disturbance mitigation, and bipedal locomotion. Linear systems and feedback control, time-domain specifications, PID control, steady-state error and disturbance rejection, and state-space analysis.
- 2005 **Software Engineering, Data Structures, Database Management Systems, Computer Graphics, Computer Architecture I/II, Microprocessor Systems, Modelling & Systems Simulation, Cryptography I**  
✓
- 2009 Queen's University & Coursera  
Software engineering concepts, data structures: lists, stacks, queues, trees, graphs. Algorithms: sorting, searching. Abstract data types, modules, interfaces, and specifications. Computer structures, instruction set architecture. Assembly language programming. Memory hierarchy, I/O, and interrupts. Pipelining and parallelism. Performance evaluation of computer systems and networks.

## awards

- 2010 **Ontario Graduate Scholarship**  
A merit-based research grant awarded by the Province of Ontario. Selection based on academic achievement and research potential.
- 2009 **NSERC - Alexander Graham Bell Canada Graduate Scholarships**  
A merit-based research grant awarded by the Government of Canada. Selection based on academic achievement and research potential.
- 2009 **IEEE Eastern Ontario Student Paper Competition**  
Represented Queen's University at a team-based project competition between universities across eastern Ontario. Selection was weighted heavily toward presentation skills and quality of work.

## publications

- 2013 **Nonlinear Control of Wind Energy Conversion System Based on Control-Lyapunov Functions** Jonathan Mash, Majid Pahlevaninezhad, Praveen Jain  
Full paper presented at a major IEEE Conference (ECCE 2013, Denver, CO)
- 2014 **Adaptive Passivity-Based Nonlinear Controller for Wind Energy Conversion Systems** Jonathan Mash, Majid Pahlevaninezhad, Praveen Jain  
Full paper presented at a major IEEE Conference (APEC 2014, Ft. Worth, TX)
- 2014 **Port-Controlled Hamiltonian (PCH)-based control approach for wind energy conversion systems** Majid Pahlevaninezhad, Shangzhi Pan, Jonathan Mash, Praveen Jain  
Full paper presented at a major IEEE Conference (PEDG 2014, Galway, Ireland)

