Robert B. MacCurdy
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Education:

Cornell University
MEng, expected May 2009
Mechanical Engineering

Cornell University/Ithaca College
B.S. / B.A. cum laude, May 1999
Electrical Engineering / Physics

Work Experience:

- Electrical Design Engineer & Project Manager: Cornell University 1999-present
  Designed, built, deployed systems for Biological research:

  Responsibilities:
  - Wrote grant proposals
  - Managed multiple concurrent projects with tightly constrained timelines and budgets
  - Participated in and led research expeditions to remote sites in Peru, Argentina, Ghana, multiple U.S. locations including deepwater marine
  - Supervised 2-4 employees, created job descriptions, recruited and hired staff
  - Specified, sought funding for and created lab & engineering shop space: basic infrastructure as well as test & development HW/SW

  Projects:
  - Real-time animal tracking system using radio transmitter tags and distributed receivers

  Leading team in developing RF tools to track free-ranging animals in remote environments. System uses inverse-GPS techniques that minimize tag power consumption and cost. Demonstrated working transmitter and receiver. Results have been published in conference proceedings. Currently seeking funding for follow-on work.

  - Free-drifting buoy with multi-element acoustic array & GPS synchronization.

  Designed and deployed set of data acquisition buoys with GPS synchronization and multi channel vertical hydrophone arrays. Part of SBIR grant to characterize sonic boom propagation above and below ocean surface.

  - Ocean bottom recorder with acoustic command/control link: "Popup"

  Redesigned mechanical and electrical components of existing ocean bottom acoustic recorder to increase performance, reliability. Designed new acoustic release hardware and software which tripled range. Reduced power consumption by order of magnitude. Reduced complexity of mechanical assemblies. Popups are used to conduct underwater animal population surveys world-wide.

  - Altitude regulating, free drifting balloon with audio recorder

  Team designed and built altitude regulating, free drifting helium balloon to carry audio recorders over inaccessible area. Conducted recordings over live fire target range at Fort Hood Army base in Texas to study population of endangered birds. Balloons used valves and control system to vent helium or water (ballast) to regulate altitude and stay within range of bird's calls. GPS receiver indicated when balloon drifted out of desired area, and on-board microcontroller landed balloon.

  - High sensitivity, low-cost, low-power microphone/preamp/filter for terrestrial recordings

  Designed microphone system with summed array of inexpensive microphone elements and user-programmable gain and filtration. Design yielded significant improvement in SNR and is an order of magnitude less expensive than comparable commercial systems.

  - Multi-channel recorder & digitally programmable active filter module

  Small, very low power, multi-channel modular recording system with programmable filters. Filter has wider frequency range, lower power consumption and lower noise than conventional switched-capacitor filter blocks. Small recording setup enabled use of much smaller vessels to conduct towed array recordings.

- Programming and Machine Design: Porous Materials Inc. summer 1998
  Designed and built lab equipment that measures bulk powder surface area. Wrote software, designed hardware, developed marketing & advertising materials, provided customer support

Papers and Conference Presentations:

- MacCurdy, R., Gabrielson, R., Spaulding, E., Purgue, A., Cortopassi, K., Fristrup, K., 2008, "Automatic animal tracking using matched filters and TDOA", *Journal of Communications* (in review)
- MacCurdy, R.B., Reissman, T., Winkler, D.W., and Garcia, E., 2008, "Energy Harvesting to Extend Wildlife Tag Lifetime", *Proceedings of ASME IMECE Conference*, IMECE2008, #68082
- MacCurdy, R., Gabrielson, R., Spaulding, E., Purgue, A., Cortopassi, K., Fristrup, K., 2008, "Real-Time, Automatic animal tracking using direct sequence spread spectrum" *Proceedings of European Wireless Technology Conference*, EuWiT, Amsterdam
- MacCurdy, R.B., Reissman, T., and Garcia, E., 2008, "Energy Management of Multi-Component Power Harvesting Systems", *In Proceedings of SPIE Conference on Smart Materials and Structures*, 6928, #6928
- Reissman, T., MacCurdy, R., Garcia, E., 2008, "Experimental Study of the Mechanics of Motion of Flapping Insect Flight Under Weight Loading", *Proceedings of ASME SMASIS Conference*, SMASIS2008, #661
- Miller, S., MacCurdy, R., Kidd, W., Hudson, J. "Stabilization and Control of a Micro-scale Helicopter" AIAA Region I Student conference, March 2008
- Acknowledged in the following papers:
    - Parks, S. E. 2003. "Acoustic communication in the North Atlantic right whale (Eubalaena glacialis)." pp. 244. Woods Hole, MA: MIT-WHOI Joint Program in Oceanography.
    - Parks, S. E., Hamilton, P. K., Kraus, S. D. & Tyack, P. L. 2005. "The gunshot sound produced by male North Atlantic right whales (Eubalaena glacialis) and its potential function in reproductive advertisement." Marine Mammal Science, 21, 458-475.
    - Parks, S. E. & Tyack, P. L. 2005. "Sound production by North Atlantic right whales (Eubalaena glacialis) in surface active groups." Journal of the Acoustical Society of America, 117, 3297-3306.
    - Thompson M, Payne K, Schwager, S. "Estimating forest elephant abundance using acoustics at Kakum National Park, Ghana" (publication pending).

Other Talks & Posters:

- "Advanced Animal Tagging" ISBE breakout sessions at Cornell, Sept 2008
- "Recent Cornell work on Advanced Animal Tags" MIGRATE conference; hosted at Cornell April, 2008
- "The BRP RF Initiative: Radio Tracking and Telemetry" presentation to Lab of Ornithology Board of Directors May 2006
- "Real-time, automatic RF animal tracking using Spread Spectrum TDOA" Poster presentations at Princeton & Cornell

Achievements:

- Member of project, titled: "Acoustical Monitoring of Threatened and Endangered Species in Inaccessible Areas" which won "Conservation Project of the Year" award in 2003 from SERDP.
- Member of first Ivory Billed Woodpecker search team. IBW was though to be extinct. Designed and built specialized recording systems that enabled acoustic census. New recordings of this bird provided compelling evidence of species' existence in Arkansas.
- Built recording devices and led field expedition that captured first recordings of isolated and endangered population of forest elephants in Ghana.

Teaching and Volunteer activities:

- Robotic ScareGull Project – Aided a team of 7th and 8th grade students at Dewitt Middle School in the design, construction and installation of an animatronic ScareGull. The ScareGull is intended to prevent gull predation from impacting a tern nesting colony. The students learned simple physics concepts (force, torque, work, power), as well as construction issues (reinforced joints, electrical wire gauge, design for reliability) and software programming on a microcontroller (timed loops, debugging strategy, real-time operation). Four of the students traveled with me to Eastern Egg Rock Island in Maine where we installed the finished prototype. Video of the installation is available on YouTube (search "ScareGull").
- Micro Vehicle INU – Supervising a team of students attempting to build an autonomous helicopter. Built the hardware and conceptual software framework, and supervise the students (all MEng) as they implement the various subsystems. Initial goals include controlled hover and aided flight (to reduce operator workload).
- Course TA – Two semesters for MAE 378 (Mechatronics)
- Wind Energy – Consulted the Town of Caroline on volunteer basis to establish a 6MW wind generation capacity. I assisted the Town with turbine site selection based on wind resource availability, turbine parameters and electrical grid interconnection accessibility.
- Web page design – Taught a series of web page creation workshops for middle and high school students. The courses were intended for students with minimal computer literacy and culminated with each student creating their own personal web page.

Honors and Professional Societies: Oracle Society; Dean's List, Ithaca College: 4 semesters; Key Society; Dean's List, Cornell; Sigma Pi Sigma; IEEE, ASME, AIAA, SPIE

Familiar with: JAVA; HTML; Visual Basic; AHDL; Pascal; Scheme; various flavors of Assembly; C/C++; schematic capture & layout (OrCAD); mechanical modeling (SolidWorks); DSP & uC embedded development (MSP430, TMS320C6x); RF & wireless design; machine tools & welding; project management, staffing & scheduling

Activities: Expert Downhill Skier (and Instructor), Snowboarding, Mountain Biking, Backpacking, Rock Climbing & Mountaineering, Windsurfing, Canoeing, Kayaking