RADIOWARE: FOUR YEARS OF "SOFTWARE RADIO" AND APPLICATIONS

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Microsoft Research Cognitive Wireless Networking Summit
June 5, 2008

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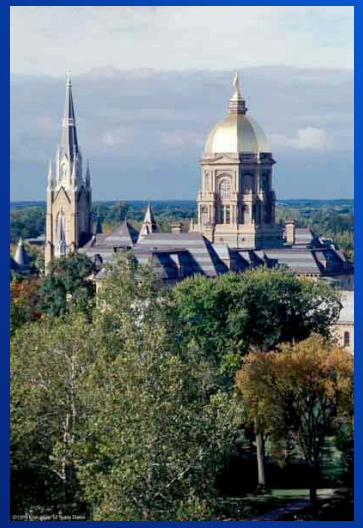
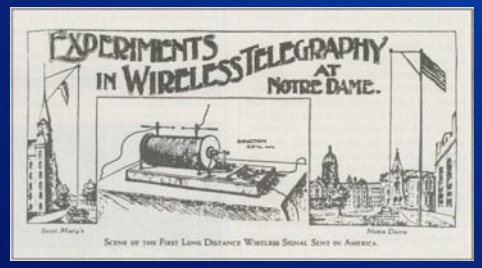
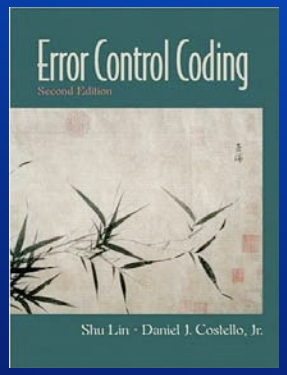
EE @ ND







- University
  - Founded 1842
  - South Bend, IN
  - Catholic, Research I
  - US News Top 25
- Department
  - 25 Faculty
  - 115 Graduate Students
  - $5-6M/year in Research (2003-2007)

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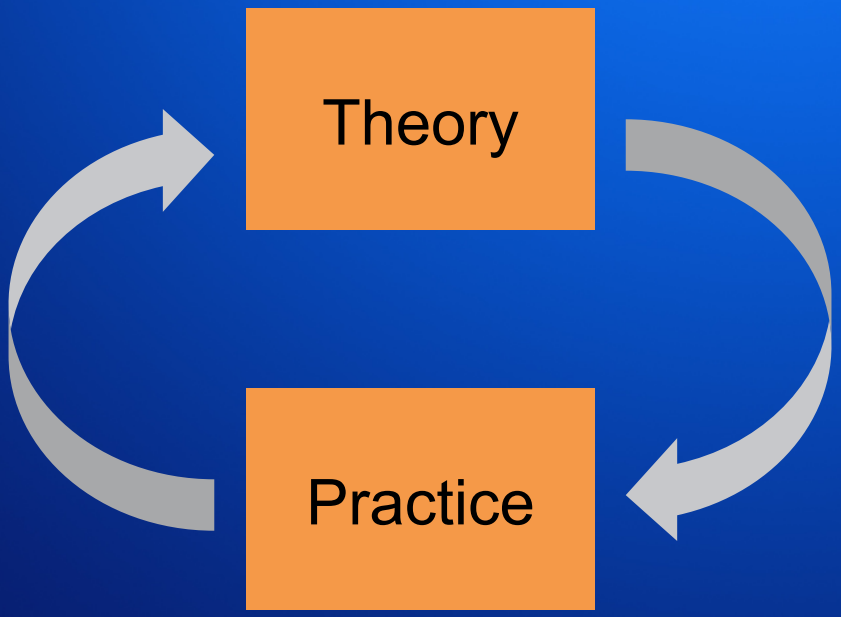
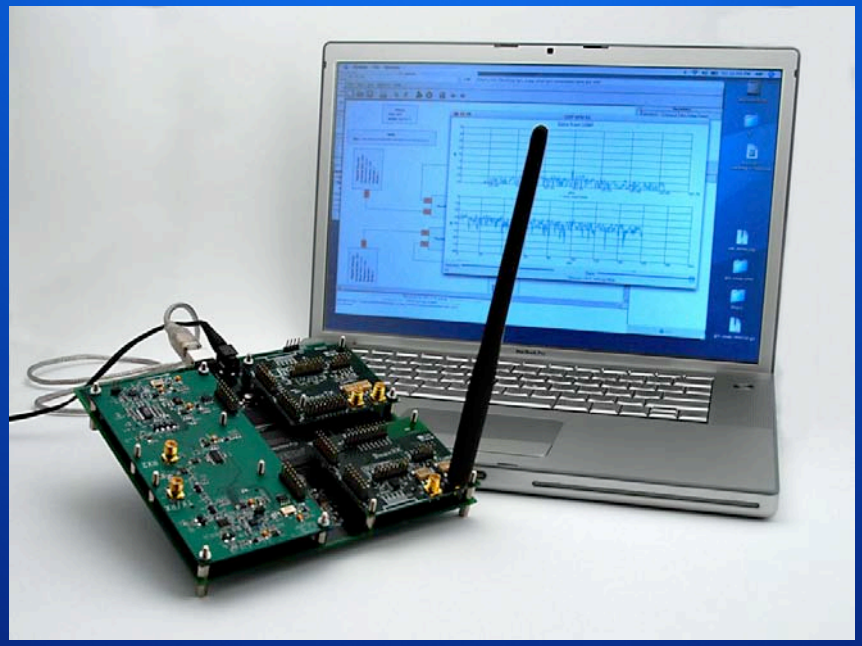
High-Level Goal



G. David Forney, Jr.

Core Platform

GNU Radio
the gnu software radio



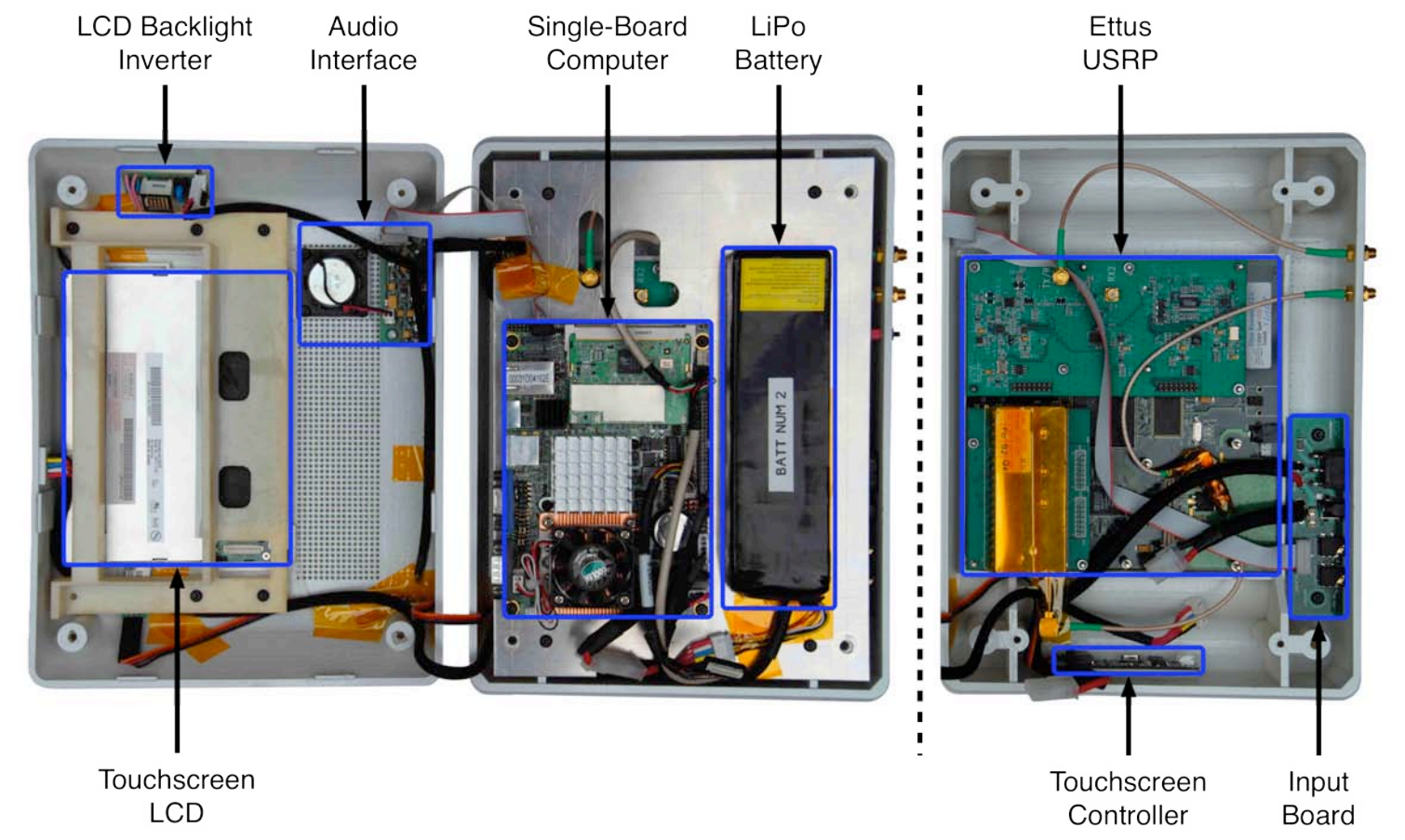
ubuntu

Ettus Research

Portable Software Radio Prototype

- Open-Source Software
  - GNU Radio
  - Application-Programming Framework (APF)
- Off-the-Shelf Hardware
  - Single-Board Computer
  - Ettus Research USRP
  - Touchscreen LCD
  - LiPo Rechargeable Battery
- *IEEE Comm. Mag.*, Aug. 2008

Prototype | Hardware



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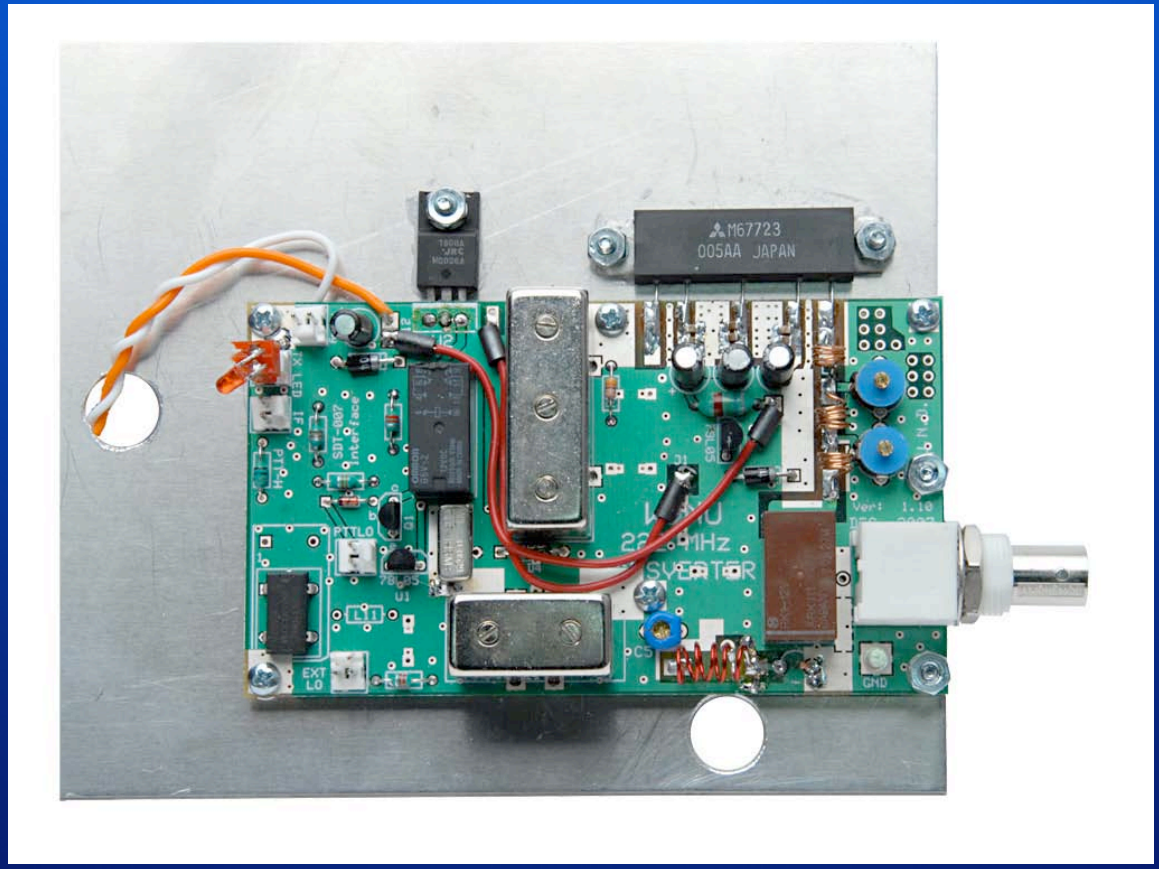
2m Transverter Daughtercard



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Current Applications

- Public safety communications
  - Intelligent multi-channel reception
  - Advanced communication bridge
  - P25 radio at NTIA in 3 weeks
- Dynamic spectrum access
- Cooperative diversity

Anything from GNU Radio with USRP

Future Applications

- Cognitive Radio
- Multi-Protocol Handsets
- Real-Time Physical Layer (PHY) Adaptation

GPP-Based Software Radio will enable entirely new wireless applications

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GPP-Based Software Radio

- Use general purpose processor (GPP), not DSPs & FPGAs for signal processing
- Develop protocols in high level language *reliably*
- Leverage existing data-transport mechanisms
- Advanced upgradeability, novel architectures
- Not currently seen in portable form-factors



Spin-Off Company: RFware

- Grand prize winner 2008 Notre Dame McCloskey Business Plan Competition
- Commercialize GPP-based portable software radio
  - *Affordable* wireless experimentation
  - Public Safety Communications
  - Government Communications
- What could you do with this?

RFWARE

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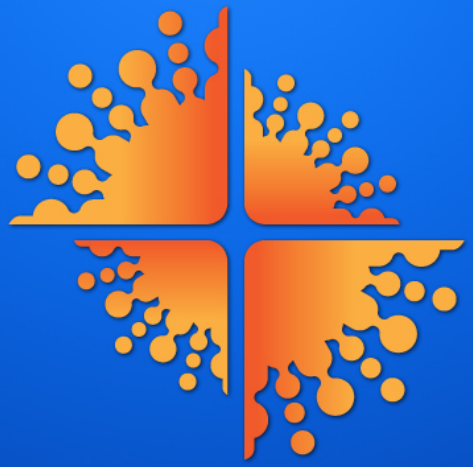

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Technology, Economics, Policy, …

Coming soon!

UNIVERSITY OF NOTRE DAME

Wrap-Up

- Summary
  - Portable software radios based upon GNU Radio and Ettus USRP
  - Algorithm and application research underway
  - Several other developments in South Bend
- Thanks

NIJ

NSF

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