Error Correction and Modulation

Requirements:

- 10 MHz occupied BW
- Bit Error Rate of 10^{-6}
- Minimize power
- Maximize data rate, on order of 5 Mbps

Error Correction:

- Rate 2/3 turbo code
- Achieves BER of 10^{-5} at S/N of 2dB

Modulation:

- 60% excess BW Nyquist QPSK
- Achieves 0.8 Hz/bps

Error Correction and Modulation (2)

Subsystem Highlights:

- Turbo codes are a newly discovered random interleaving of multiple recursive convolutional codes, which achieve performance near the Shannon limit.
- Requires simple hardware for modulation & encoding (on robot).

Primary issue to be addressed:

Complexity and cost of Turbo decoder.

Trade-off between constant envelope modulation and class C power amplifier.

THE ROBOTICS INSTITUTE
Carnegie Mellon University