

[Home](#) > [ETDS](#) > [THESES](#) > [677](#)

Masters Theses 1896 - February 2014

Off-campus UMass Amherst users: To download campus access theses, please use the following link to [log into our proxy server](#) with your UMass Amherst user name and password.

Non-UMass Amherst users: Please talk to your librarian about requesting this thesis through interlibrary loan.

Theses that have an embargo placed on them will not be available to anyone until the embargo expires.

Physical Information Theoretic Bounds on Energy Costs for Error Correction

[Download](#)

[SHARE](#)

[Natesh Ganesh, University of Massachusetts - Amherst](#)

[Follow](#)

Document Type
Open Access

Degree Program
Electrical & Computer Engineering

Degree Type
Master of Science in Electrical and Computer Engineering (M.S.E.C.E.)

Year Degree Awarded
2011

Month Degree Awarded
September

Keywords
Error Correction, Linear (n, k) code, Heat Dissipation, Generalized Efficacy Measures, Information Loss, Fundamental Lower Bounds

Abstract
With diminishing returns in performance with scaling of traditional transistor devices, there is a growing need to understand and improve potential replacements technologies. Sufficient reliability has not been established in these devices and additional redundancy through use of fault tolerance and error correction codes are necessary. There is a price to pay in terms of energy and area, with this additional redundancy. It is of utmost importance to determine this energy cost and relate it to the increased reliability offered by the use of error correction codes. In this thesis, we have determined the lower bound for energy dissipation associated with error correction using a linear (n,k) block code. The bound obtained is implementation independent and is derived from fundamental considerations and it allows for quantum effects in the channel and decoder. We have also developed information theoretic efficacy measures that can quantify the performance of the error correction and their

Enter search terms:

[Advanced Search](#)

[Notify me via email or RSS](#)

[Browse](#)

[Collections](#)

[Disciplines](#)

[Authors](#)

[Author Corner](#)

[Author FAQ](#)

[Links](#)

[University Libraries](#)

[UMass Amherst](#)

[Contact Us](#)

relationship to the corresponding energy cost.

Advisor(s) or Committee Chair
Anderson, Neal G

This page is sponsored by the [University Libraries](#).

© 2009 [University of Massachusetts Amherst](#) • [Site Policies](#)