MEng Design Project Announcement – 2017-18 AY

**Project title:** Self-prediction of accuracy in neural networks

**Brief Description of Design Project Goals:**

**Overview:** Neural networks, somewhat simplistically, may be viewed as representation of approximation to relationships based on correlations. Larger weights represent stronger correlations and smaller weights the weaker correlations. Overfitting and underfitting arises in the choices made in training and the network variables to approximate. An inference as a calculated result is only as useful as the degree of confidence one may have in that conclusion. Most complex tasks of nature have simple mechanisms to eliminate errors. Wallace-Darwinian mechanism emphasizes adaptation features. Protein folding through the energetics of the patterns recognizes unacceptable paths and unfolds. Neural networks as an approach to tackling complexity needs an understanding and approaches to predicting inaccuracies and gross incorrectness within its processing. This project will develop and employ simple deep learning neural networks and evaluate approaches for representational simple tasks to predict the confidence in inference tasks.

**Specific MEng Contribution:**
(a) write code in python, (b) perform simulations, (c) explore mathematically and through simulations cause and effect (d) extract informational examples where gross inaccuracies can be predicted neurally. The student is expected to have a background knowledge in neural network principles, statistical mechanics, and information theory. And know matlab. All the code writing will be in python.

**ECE Field Advisor Name:** Sandip Tiwari
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**Number of MEng Students Needed:** 1

**Required Skills:**
Python, probability and statistics, neural networks, statistical and information mechanics.

**Estimated Project Time Frame:**
The advisor will meet the student at least once a week individually and in group. Weekly effort and discussions are expected with a strong collaboration that develops in-depth understanding.

2017-18 Academic Year, Two (2) Semesters