

Table of Content

CHAPTER 1 INTRODUCTION.....	- 1 -
1.1 MOTIVATION	- 2 -
1.2 OBJECTIVES AND STATEMENT	- 4 -
1.2.1 <i>General Objective</i>	- 4 -
1.2.2 <i>Specific Objectives</i>	- 4 -
1.2.3 <i>Statement and Thesis Scope</i>	- 4 -
CHAPTER 2 METHODOLOGY	- 5 -
2.1 LITERATURE REVIEW.....	- 5 -
2.2 DEEP LEARNING FRAMEWORK PROPOSAL	- 5 -
2.3 VALIDATION DATASETS.....	- 5 -
2.4 MODEL TRAINING.....	- 5 -
2.5 RESULTS, METRICS AND UNCERTAINTY	- 6 -
CHAPTER 3 BACKGROUND	- 7 -
3.1 MACHINE LEARNING	- 7 -
3.1.1 <i>Classification and Regression</i>	- 8 -
3.1.2 <i>Supervised and Unsupervised Learning</i>	- 10 -
3.2 DEEP LEARNING	- 11 -
3.2.1 <i>Deep Neural Networks</i>	- 12 -
3.2.2 <i>Regularization</i>	- 15 -
3.2.3 <i>Convolutional Neural Networks</i>	- 16 -
3.2.4 <i>Recurrent Neural Networks and Long-Short Term Memory Cells</i>	- 18 -
3.3 DEEP LEARNING IN PROGNOSTICS FOR MECHANICAL COMPONENTS	- 20 -
3.3.1 <i>C-MAPSS Dataset for Turbofan Engines RUL Estimation</i>	- 20 -
3.4 DEEP LEARNING IN LITHIUM-ION BATTERY STATE ESTIMATION.....	- 25 -
3.4.1 <i>State of Charge</i>	- 26 -
3.4.2 <i>State of Health</i>	- 26 -
3.4.3 <i>CS2 Dataset for Batteries SOC and SOH Estimation</i>	- 27 -
3.5 UNCERTAINTY WITH DROPOUT AS A BAYESIAN APPROXIMATION	- 30 -
CHAPTER 4 PROPOSED DEEP LEARNING FRAMEWORK.....	- 31 -
4.1 DATA PREPROCESSING.....	- 31 -
4.2 TRAINING SAMPLES	- 32 -
4.3 CONVOLUTIONAL LAYERS	- 33 -
4.4 BIDIRECTIONAL LSTM	- 34 -
4.5 TRAINING.....	- 35 -
4.6 HYPERPARAMETERS SELECTION AND REGULARIZATION	- 36 -

CHAPTER 5 C-MAPSS TURBOFAN ENGINES	- 37 -
5.1 MODEL TRAINING, PERFORMANCE AND COMPARISON	- 37 -
5.2 UNCERTAINTY MEASUREMENT ON MODELS' ESTIMATION.....	- 39 -
CHAPTER 6 CS2 LITHIUM-ION BATTERIES	- 44 -
6.1 MODEL TRAINING, PERFORMANCE AND COMPARISON	- 44 -
6.2 UNCERTAINTY MEASUREMENT ON THE MODELS' ESTIMATION.....	- 47 -
CHAPTER 7 CONCLUDING REMARKS	- 52 -
7.1 CONCLUSIONS.....	- 52 -
7.2 FUTURE WORK	- 55 -
BIBLIOGRAPHY.....	- 56 -