



**Embedded Electrical and Computer Engineering**

# **MASTER ORAL DEFENSE**

**TITLE:** *The Electronic Modeling and Implementation of Neurological Synaptic Gap*

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**COMMITTEE CHAIR:**      **Dr. Hamid Mahmoodi**

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## **ABSTRACT**

Synapses are the essential elements for computation and information storage in both real and artificial neural systems. An artificial synapse needs to remember the past history, store a continuous set of states and be “plastic” according to the pre-synaptic and post-synaptic neuronal activity. Many different circuit implementations of synapse function exist with different computational goals in mind. The research study is aimed at the design of electronic synapse in nanoscale CMOS technology. Circuit design in nanometer scale is important for the scaling of future synthetic neural systems. Furthermore, the proposed design exhibits plasticity which is the underpinning process for cognitive behavior. The designs are simulated using Hspice in 22nm technology to show biomimetic capability. This experimental demonstration opens up new possibilities in the understanding of neural processes, an important step forward to reproduce complex learning, adaptive and spontaneous behavior with electronic neural networks.