

# Thesis Proposal

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## 1 Abstract

Recurrent, continuous-time networks have powerful computational properties.

Liquid state machines with high dimensional nonlinear dynamics are a biologically plausible mechanism for cognitive tasks.

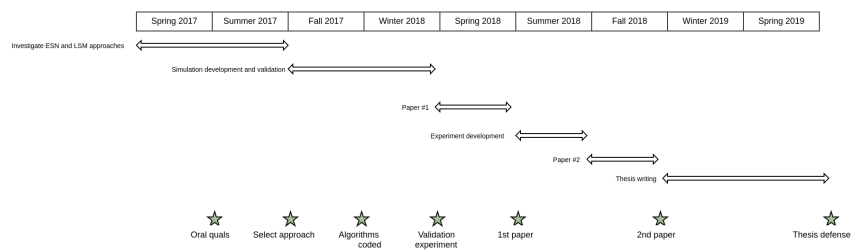
Nonlinear delay dynamics can virtualize spatial nodes into temporal time slots.

Ultrafast photonic implementation can virtualize very large spatial networks that run at slower timescales.

Many signals of interest are stationary or cyclostationary.

Spike-timing dependent plasticity is a plausible biological mechanism for liquid state network training.

Figure 1: Schedule



- 2 Introduction
- 3 Thesis Statement
- 4 Approach
- 5 Preliminary results
- 6 Work plan
- 7 Implications of research
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