AFRL Engagement

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My Experience with AFRL

- AFRL Information Directorate (RI), Rome, NY
  - Met several AFRL folks ~2021 through Aware-AI visit
  - Completed 2 summer SFFPs at AFRL between 2022-2024 (and now 2025)
    - ➢ Neuromorphic Computing at AFRL/RITB
  - One AFRL research extension grant while at RIT (2024-2025)

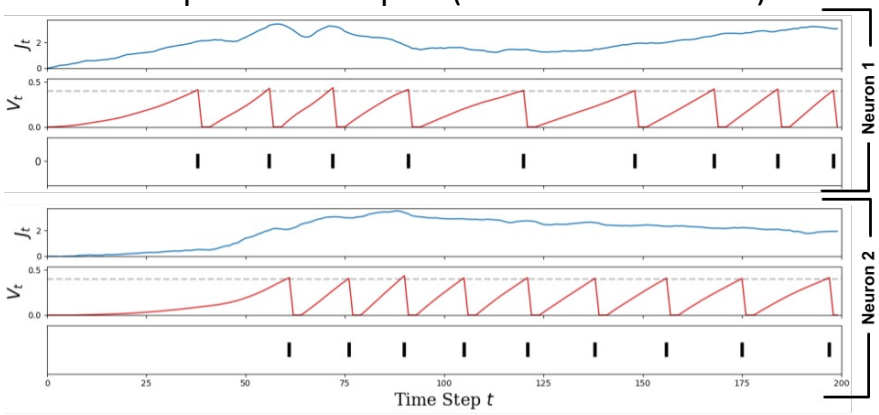
Common Thread of AFRL Collaborations

- Neuromorphic computing and dynamic control
  - How can we create more energy-efficient means of control and decision-making? Using concepts from neurobiology
  - How do we solve the difficult problem of biologically-plausible learning?

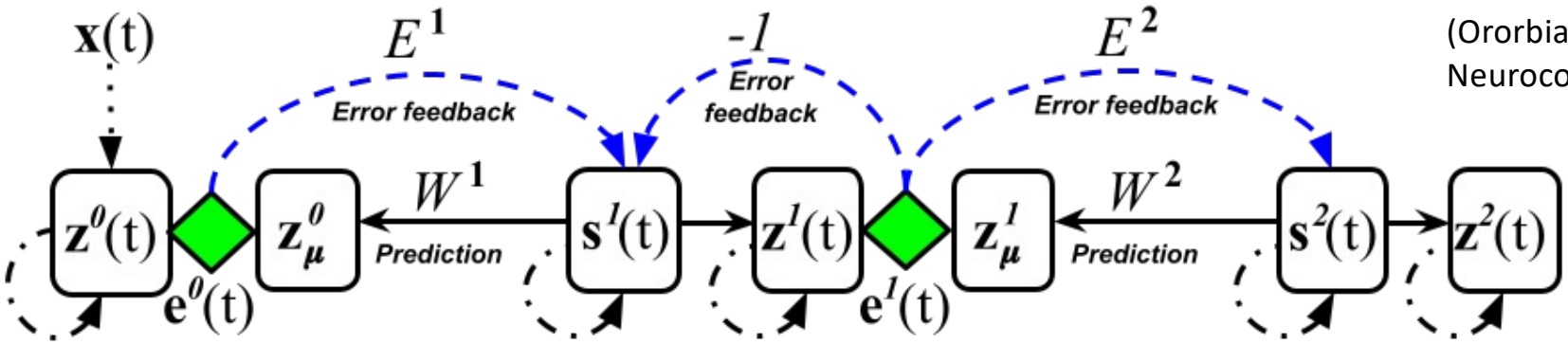
What I do…

- The spiking neural coding network (*SpNCN*)
  - Spike emission function = **leaky integrate-and-fire** (***LIF***) w/ absolute refractory period
  - Key compartment: activation ***trace***; corresponds to concentration of glutamate neurotransmitter bound to synaptic receptors

SpNCN raster plot (2 selected neurons)

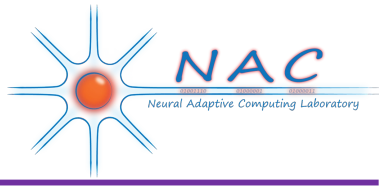


$$\tau_m \frac{\partial \mathbf{v}^\ell}{\partial t} = -\gamma_m \mathbf{v}^\ell(t) + R_m \mathbf{J}^\ell(t) \qquad \bar{\mathbf{s}}^\ell(t) = \mathbf{v}^\ell(t) \bar{\geq} \bar{\mathbf{v}}_{thr}$$



(Ororbia, 2023, Neurocomputing)

Lessons Learned



- Keep being inquisitive, and make sure you can show concrete demo's of what you do – tie your research to AFRL's aims
  - Summer faculty fellowships are excellent
  - Bring your PhD student with you if you can (to SFFP/VFRP)

- What Cory said/says!