U.S. ARMY RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND

Taking new concepts for systems design and control from neuroscience to accelerate innovation in artificial intelligence

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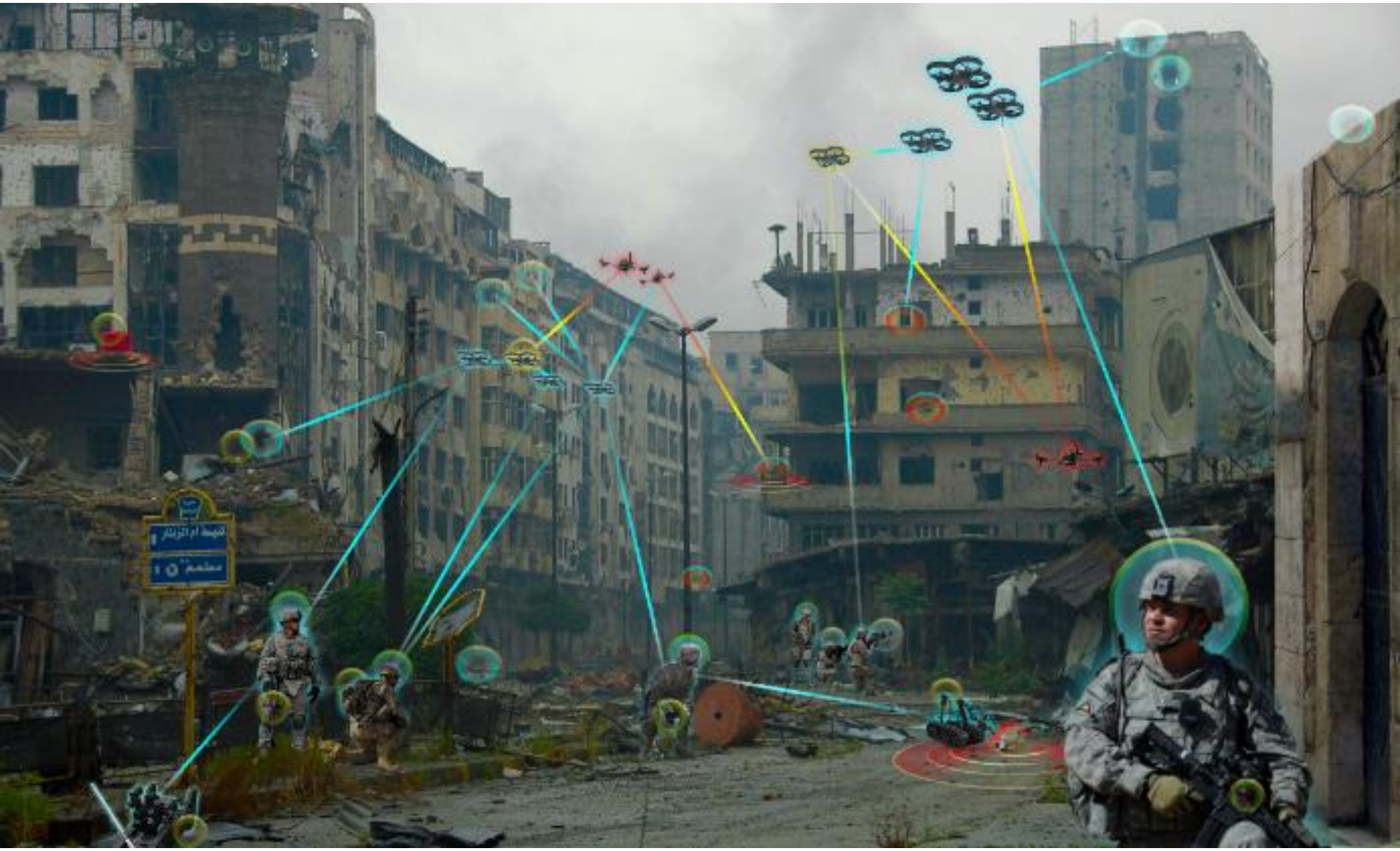
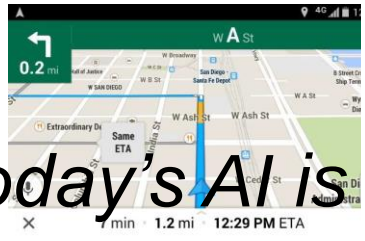
APPROVED FOR PUBLIC RELEASE

AI AND THE FUTURE BATTLE



AI IN THE CURRENT CONTEXT

Artificial Narrow Intelligence (ANI)



- clearly-defined, measurable tasks
- performance uncertainty is tolerable
- standard approaches don't work
- LOTS of training data is accessible

Artificial General Intelligence (AGI)

- ill-defined, difficult-to-measure tasks
- "human-like" performance is needed
- standard and ANI (?) approaches don't work
- Long experience may be necessary

Today's AI is brilliant at very narrow competencies, whereas humans are good at pretty much everything.

- Dr. Sean Holden, Cambridge University (Donnelly, 2016)

AI IN THE CURRENT CONTEXT

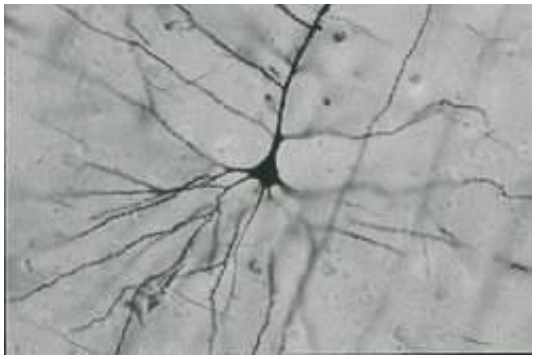
[N]arrow AI techniques, used to solve specific problems, will dominate AI application in the next 10 years, accounting for 99.5% of AI revenue between 2016 to 2025.

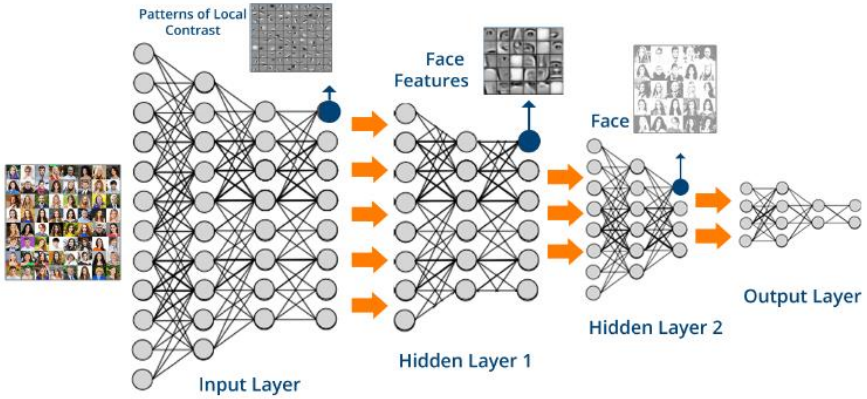
- Tractica (2016)

INSPIRED BY NEUROSCIENCE?

$$\tau_m \frac{du}{dt} = - u(t) + R\, I(t)$$

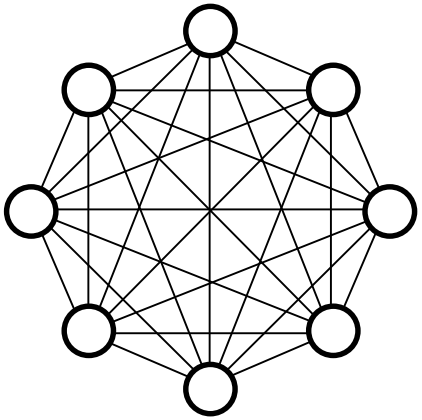
?

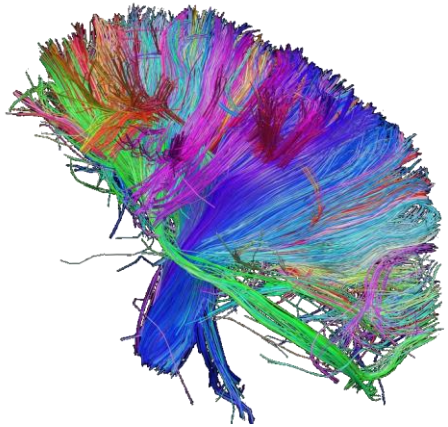




- Highly-simplified neurons
- Homogeneous neuron types

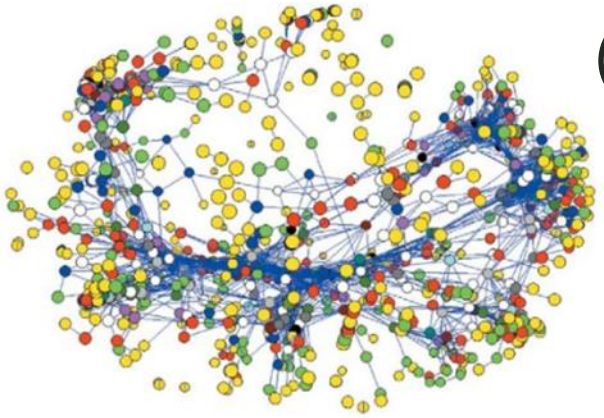
- Hierarchically organized
- Quiescent
- Highly connected



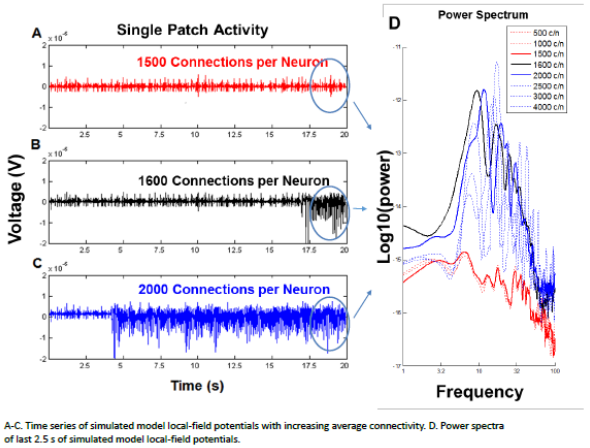


BECOMING MORE "BRAIN-LIKE"

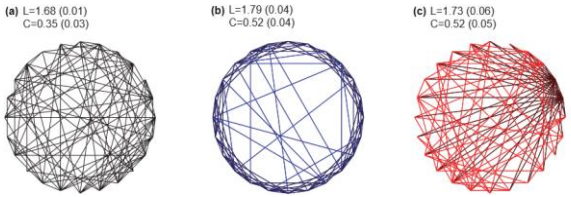
(see Crone et al. poster at this conference)



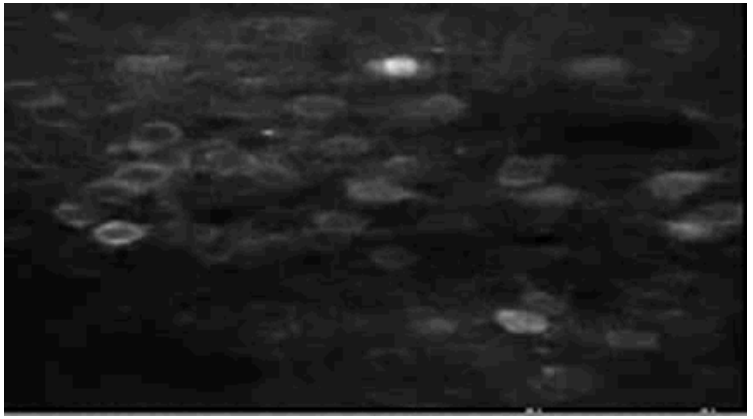
1 connectivity



A-C. Time series of simulated model local-field potentials with increasing average connectivity. D. Power spectra of last 2.5 s of simulated model local-field potentials.

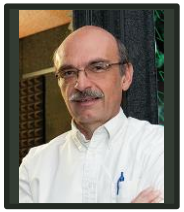


2 dynamics



(see Felton et al. poster at this conference)

PROJECT TEAM



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DISCUSSION

1. connectivity

2. dynamics