Making AI Fly

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Embedded Tech Trends

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INNOVATION THAT MATTERS ®

Elon Musk @elonmusk

Replying to @elonmusk

China, Russia, soon all countries w strong computer science. Competition for AI superiority at national level most likely cause of WW3 imo.

♡ 45.8K   4:33 AM - Sep 4, 2017

💬 22K people are talking about this

AI is redefining global power

The U.S.A. Leads in Consumer AI…

- Apple Siri, Google Assistant, Amazon Alexa, MS Cortana

- Smart vehicles

- Facebook

- Financial fraud

- Shopping preferences

Industry focus is on performance, scale and cyber

However, Defense AI Remains a Blue Ocean

- War games – Simulations - Training
- ISR – Radar - 3D terrain simulation - Navigation
- Cognitive electromagnetic spectrum maneuverability –
- Spectral efficiency
- Holistic situational awareness - Sensor fusion
- EW/cyber-attack and protection
- Scalable and resilient networks

Similar calculations but different applications and missions

So far, consumer-tech have tried…

- Intriguing Opportunities in Defense
  - Government funding initiatives
  - Possible re-use of industry code base

- But…
  - Lack of training data (secret)
  - Incompatible employee cultures
  - Lack of understanding of business model
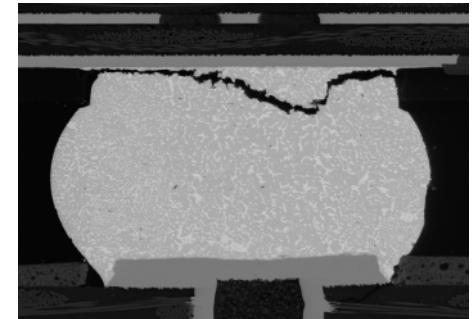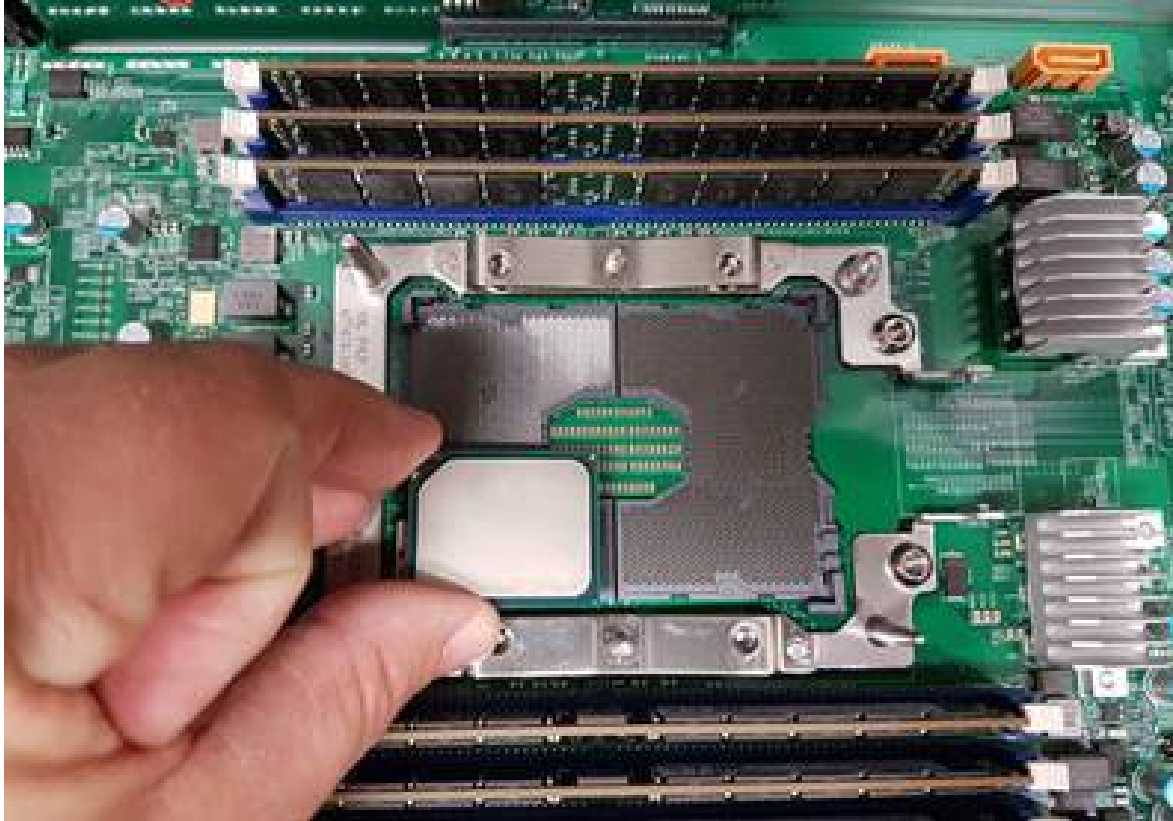 - Missing other capabilities…

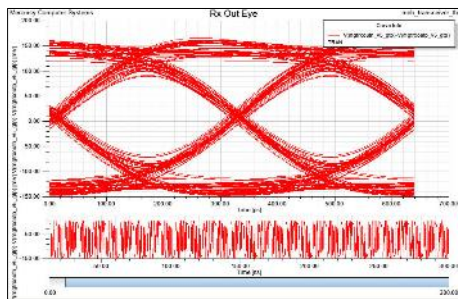Many are struggling, or already failed
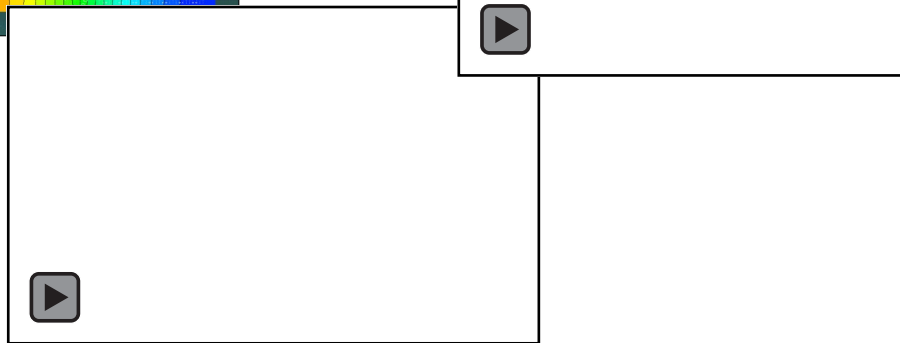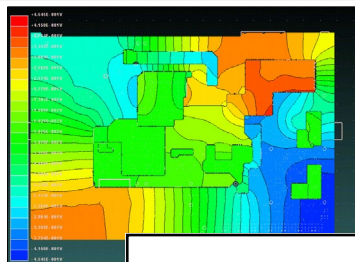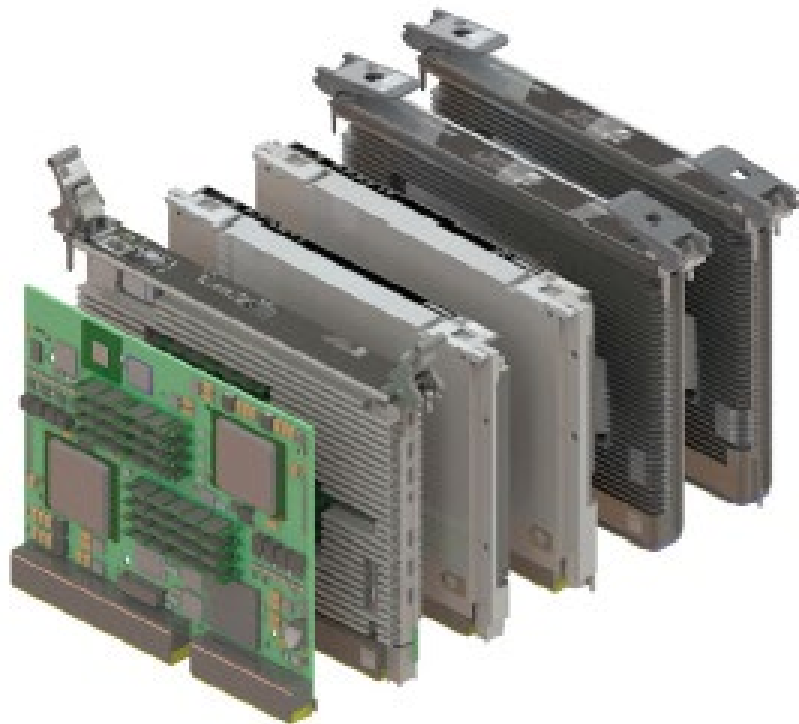
The Challenges of Defense AI…

- Extended life (decades)
- Size constraints
- Weight limitations
- Power
- Shock and Vibe
- Hardware Security, AT
- Software Security, Cyber
- Safety Certifications

.. Require a team with experience in high performance, security, safety

Processors we have, and what we need

Technology of Survival

Security against a different kind of adversary…

released Monday, Aug. 25, 2014 by the Iranian Revolutionary Guards, purports to show tl
Iran claims it shot down near an Iranian nuclear site. (AP / Sepahnews)

- Advanced Enclosures
- Root of Security
- Secure Hypervisors
- Encryption
- Anti Tamper
- Controlled Supply Chain

… than commercial industry is accustomed to

Mission and Control Systems

- When algorithms control critical parts of the platform, standard warranty is not enough

- Fully traceable hardware and software is critical

- Applicable to a vast variety of platforms

- Safety is not peanut butter

Require certifiable hardware solutions to prevent failure

Trusted Sourcing

- Local sourcing of:
  - Components
  - Motherboards
  - Software
  - Manufacturing
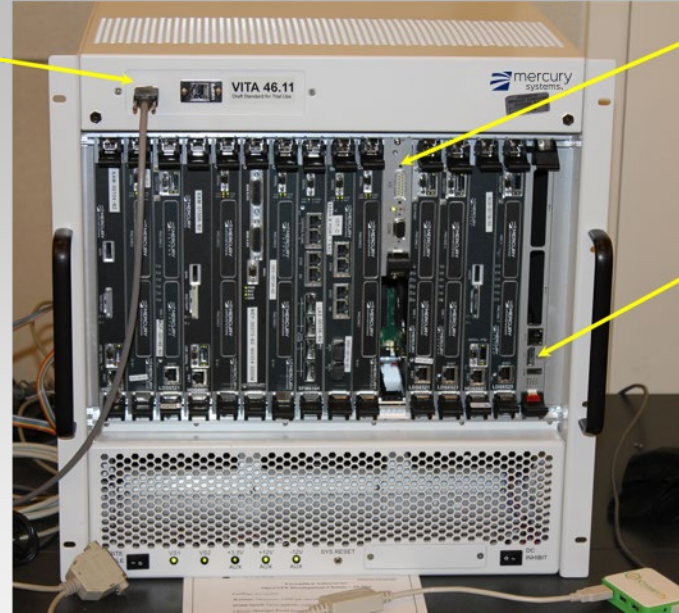 - Design
  - Support
  - People!

US national capabilities in manufacturing is at an all time low

Open Standard Architectures

Allow for affordability, upgradeability, adaptation

AI Subsystems - Commercial Example
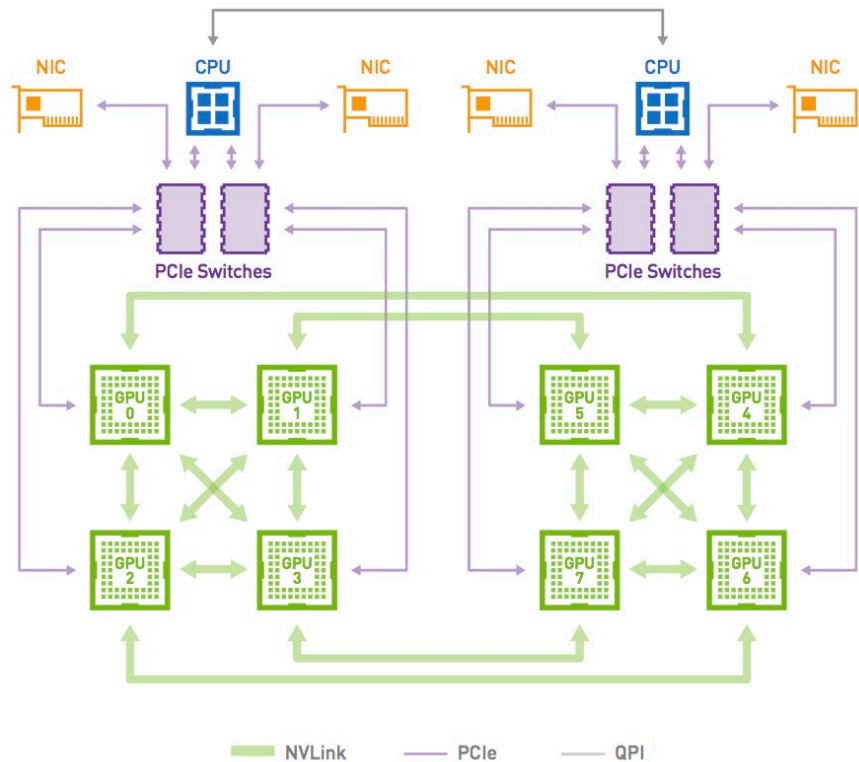
NVIDIA's DGX with HGX Architecture

AI Subsystems – Rugged and Secure

AI Processor
- 2x Intel Xeon E5
- 8x NVIDIA Pascal GPU
- PCI Express Switch
- 24 Input/Outputs
- Other IO and Storage Available

Processor

Xeon ↔ Xeon

SWAP Optimized
- 10 Slots (including PS)
- 128GB CPU RAM, 1.2 TFLOPS
- 8x16GB = 128 GB VRAM
- 16384 GPU Cores = 50 TFLOPS
- INT8 4x Inference = 192 TOPS
- AFB, LFB or LFT @ 1500W

Sensors

Sensors

IO Carrier

Switch

Switch

Switch

GPU Module
NVIDIA NVIDIA

GPU Module
NVIDIA NVIDIA

GPU Module
NVIDIA NVIDIA

GPU Module
NVIDIA NVIDIA

I know not with what weapons
World War III will be fought.
-- Albert Einstein

Thank you!

For more, check out our whitepaper!

Embedded Cognitive Computing and Artificial Intelligence

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