

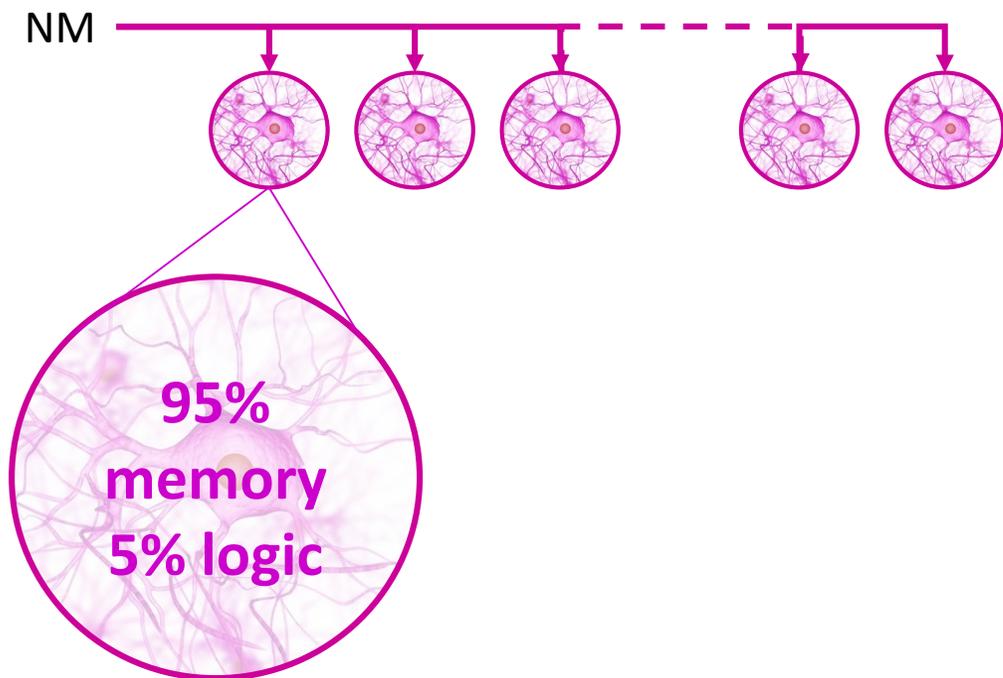


- Real-time Life long learning
- Always-On pattern recognition
 - Classification
 - Anomaly and Novelty detection
- Deterministic latency (μ secs)
- Low power (mWatts)
- Explainable AI



3rd Wave of AI chips

NeuroMem



Bank of identical neuromorphic memory cells

Working in parallel

Exact and fuzzy matching

Learn by examples

Memory and processing in a same cell

Deterministic latencies

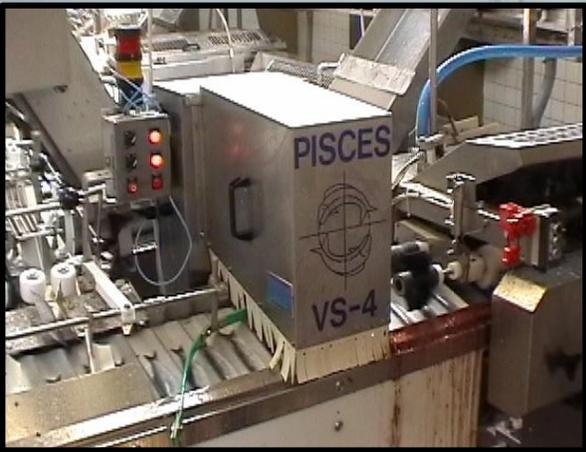
Low power

Knowledge Traceability



Unique architecture

NeuroMem



2003, Pulnix ZiCAM
(312 neurons)

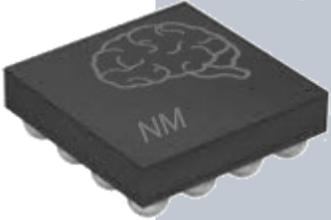


- 50 systems, in continuous operation, saving US\$2M per boat,
 - Trained in deep sea waters by Nordic fishermen
 - No cloud access



Field Proven Technology

NeuroMem



Technology in high demand

Machine learning
Edge Intelligence
Data Analytics
Predictive maintenance
Failure analysis
Novelty detection

Numerous applications

Video & Image analytics
Signal and audio analytics
Scientific analytics
Text & packet analytics

Across many industries

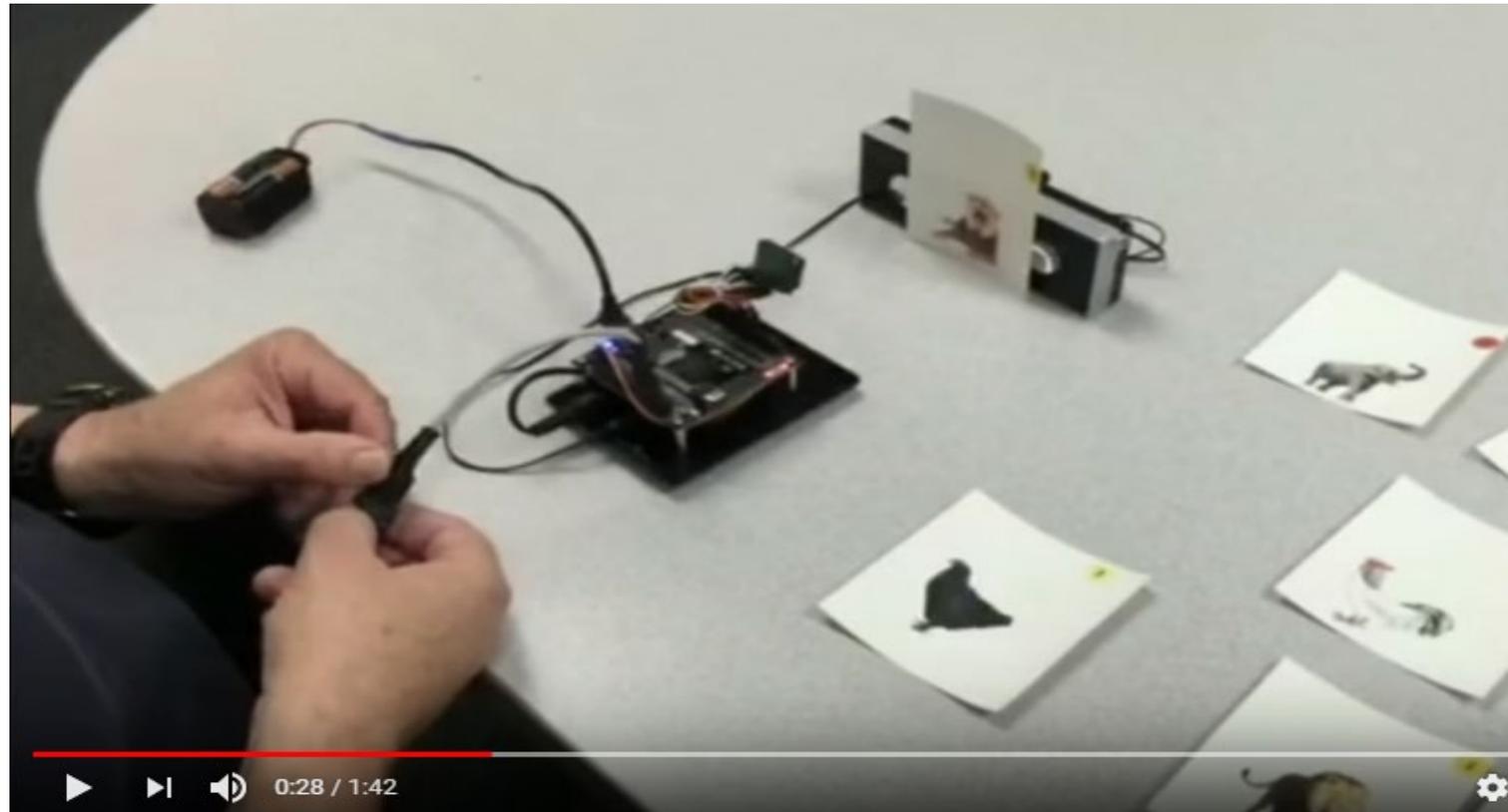
Aerospace
Automotive
Consumer electronics
Environment
Healthcare
Industrial
Other



Available Now!

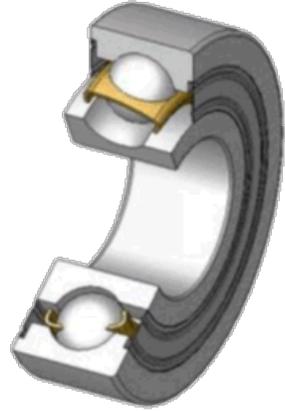
NeuroMem

Battery operated Image to Speech demo, real-time learning of flash cards, no software

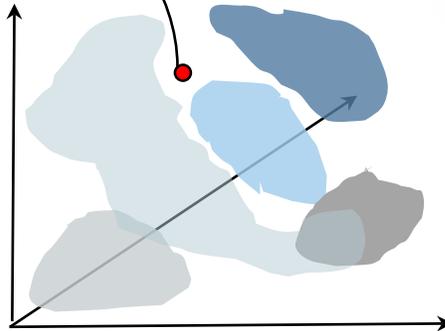
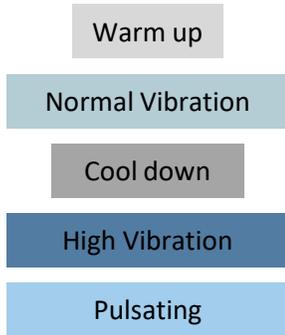


Low power, Miniature

NeuroMem



Anomaly!



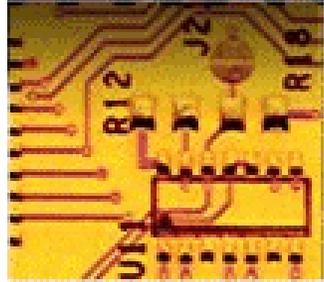
- Stimuli
 - Voltage, Torque, Sound, Vibration
 - Angle, velocity
 - Temperature (human, ambient)
 - Biosensors
- Learning
 - Supervised learning of normal operations
 - Unsupervised learning of novelties
- Recognition
 - Sensors to transmit only information of interest: Events, drifts, novelties
 - Adaptive control



Signal Monitoring & Predictive Maintenance

NeuroMem

Trainable
photocells &
industrial cameras



Industrial and
professional vision
systems

Embedded and
low-power
systems

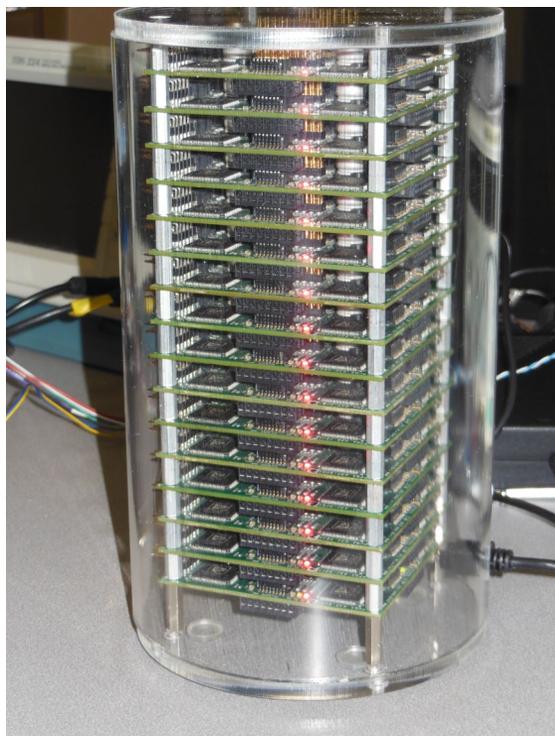


- Stimuli
 - Live video
 - Images, movie files
 - Combined with audio, GPS, etc.
- Learning
 - Discrete objects
 - Colors, shapes, alignments
 - Textures and surfaces
- Recognition
 - Identification
 - Classification
 - Defect or novelty detection
 - Disparity localization



Artificial Vision

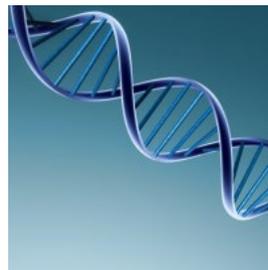
NeuroMem



NeuroTube, 65536 neurons

40,000 pattern/second
= 2,684,354,560,000 ops/sec
= 2.68 Teraoperations/sec @ 12 Watts
= 223 Gigaoperations/sec/watt

Power efficiency @ 10 MHz:
12 Watts
(24 volts/0.5 Amp)
386 Mips per milliwatt



• Stimuli

- Tweets
- Documents
- Computer logs, financial logs
- Packet uplinks

• Learning

- Dictionaries of words and expressions
- Random encrypted lookups

• Recognition

- Word spotting and counting
- Exact matching
- Clustering
- Drift and anomaly detections
- Trending and prediction



Analytics and Security in Text & Packets

NeuroMem

Text (1D)



Signal (1D)



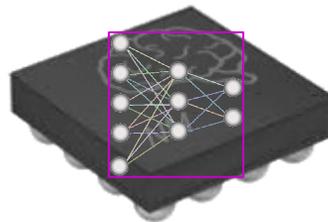
Image (2D)



Broadcast
Pattern/
Stimuli



Teach



Save/Restore
Knowledge built by
the neurons



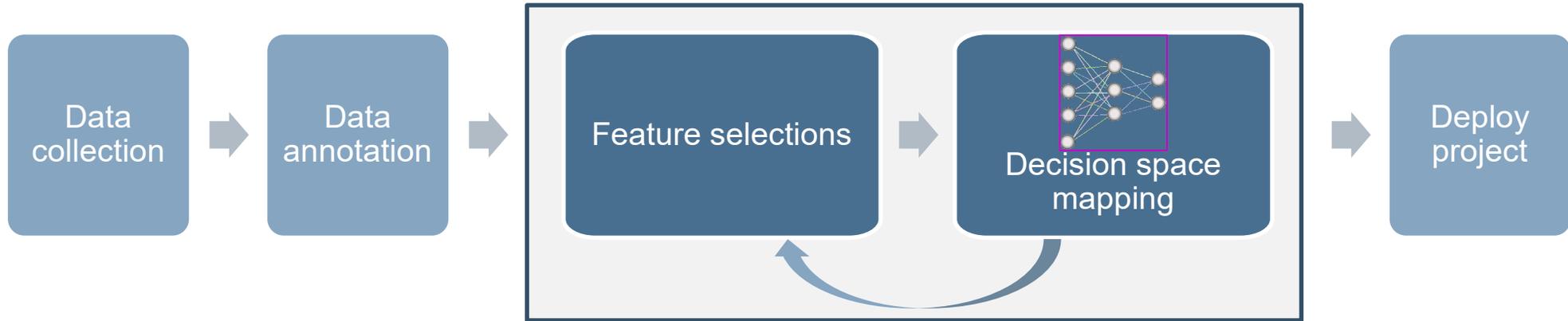
Recognize and react



Simple I/Os

NeuroMem

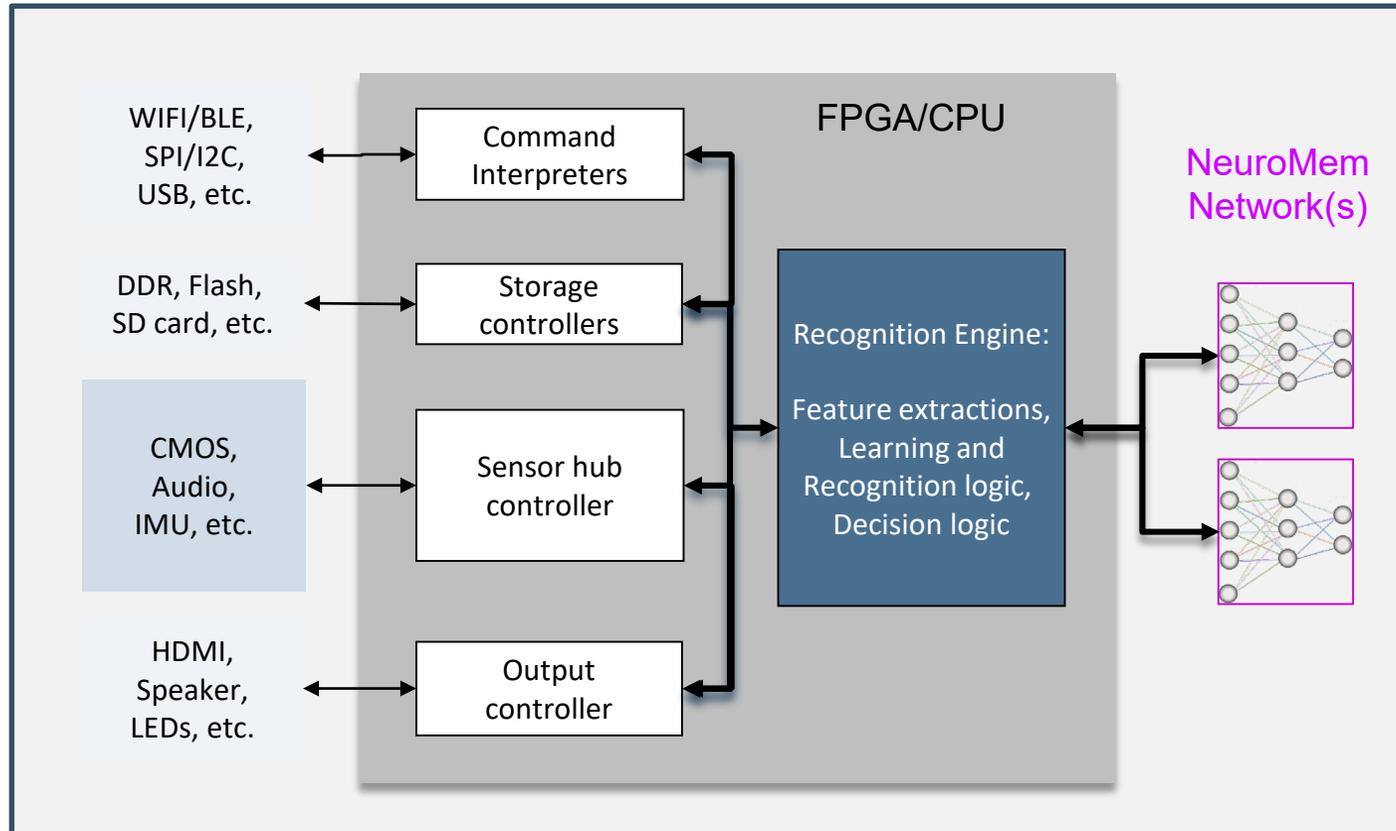
Knowledge Builder Tools



Development workflow

NeuroMem

A simple common platform



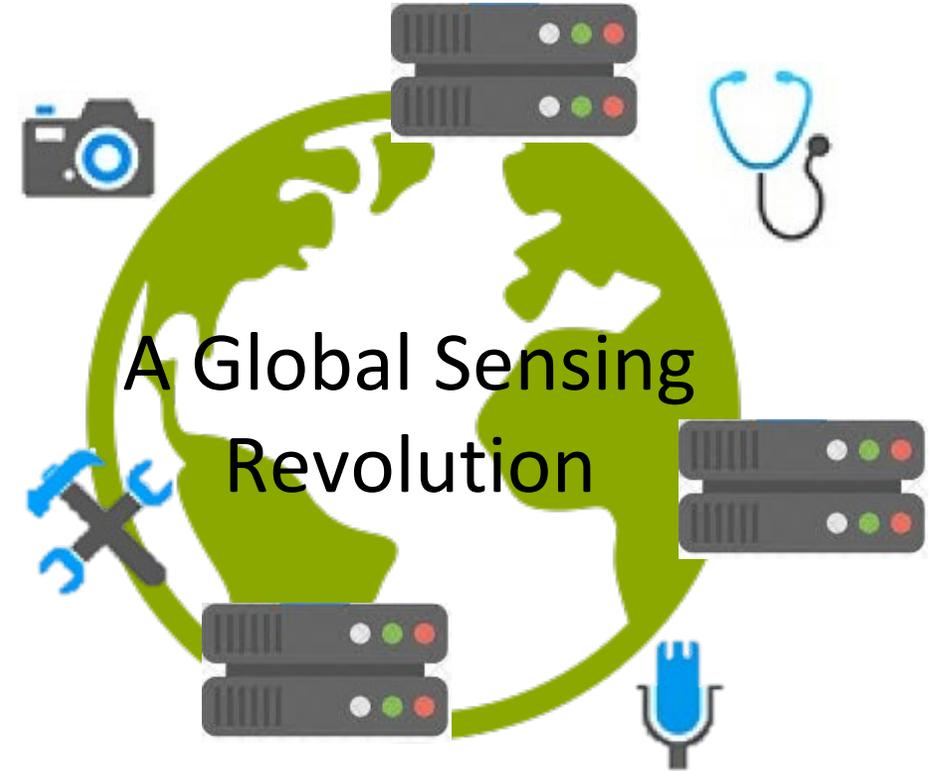
Deployment Platform

NeuroMem

Proliferation of NeuroMem_Smart sensors with autonomous actuation and selective transmission and storage

Commoditization of NeuroMem_Smart secure IT

NeuroMem_Smart servers and data centers with distributed low-power search engines



Empowering Global Sensing

NeuroMem