Sensor Fusion & Artificial Intelligence

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* Engineering think tank and advanced concepts house in cooperation with academia

* Supports commercialization and strategic planning for businesses, institutions, agencies, and entrepreneurs
School of Innovation, Design, and Engineering (IDT), Embedded Systems (ES) research profile (Västerås)

* 25 professors
* 50 PhD
* 70 PhD students
* 6 research areas
  * Robotics & Avionics
  * Dependable systems
  * Real-time systems
  * Software engineering
  * Sensor systems & health
  * Verification & Validation
* 105 MSEK/year
Secret box... Ask at the end.
R&D Frontier – Intelligent Decision Support

* Virtual Network Protocol
* Local Data Fusioning
* Intelligent Decision Support from “Big data”
* Intelligent remote-operation management, control and monitoring (Making decision tools)

* Intelligent environment recognition support and management (e.g. Vision and Acoustic)

* Intelligent coordination support and decision-making (Perception and Cognition)

* Communication and networking (Communication Models and protocols)

* Semantic Middleware and common information model (Service Discovery, Composition and Orchestration)
Optimizing hardware

Performance = f(FPGA, MCPU, GPU)
Response time = g(FPGA, MCPU, GPU)
Energy Consumption = j(FPGA, MCPU, GPU)

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SA = Software architecture
Optimizing software

Software components

Models

HW model

System

Vision
3D-sensor
Sonar

Sensors

FPGA

System EFPs

Performance: ...
Timing: ...

Code

EFPs

Time: ...
Memory: ...
Energy: ...

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* Industrial standard form factor, Heterogeneous safety critical & fault tolerant TFLOP class sensor fusion node
* 40 Gbps
* CPU, GPU, FPGA in heterogeneous system architecture (4 CPU, 2 units, 160 shader cores GPU, 12 Mgate FPGA)
* Rapid prototyping of new safety critical control systems, AI algorithms, Vision algorithms, real-time sensor information analysis
Multicore time-space partitioning

* Popcorn Linux
* Virginia Tech
Autonomous Operation

* During the second world war roughly 165,000 mines were placed in the Baltic Sea
* 40,000 are expected to be remaining
**TODAY**

- 5-14 FPS @ 5 Mpix
- Linear filtering, 1-2 parameters
- Few images
- Post processing

**TOMORROW - POSSIBLE**

- 50-250 FPS @ 10-30 Mpix
- TB storage
- SQL database
- Non-Linear filtering, 9-11 parameters
- Self learning
- Indexing, data on demand
- Clients
Thank You for listening

Secret box...