

Embedded Systems

Harald Hönninger (Adrian Hanussek):
„Embedded Systems“

Forschungsausschuß des Münchner Kreises
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Outline

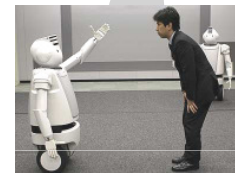
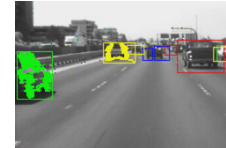
- Systems with software
- The story of a marriage
- Technology and management innovation
- Embedded IT for software-intensive Systems!



Embedded Systems

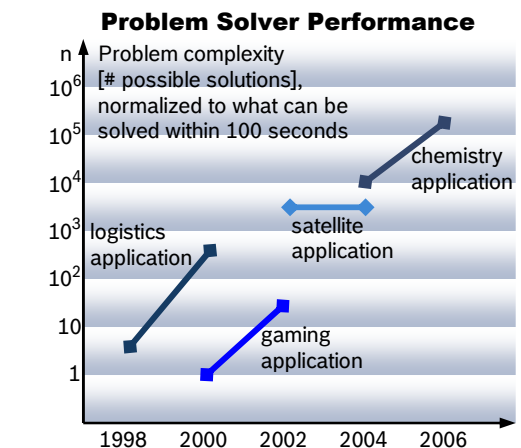
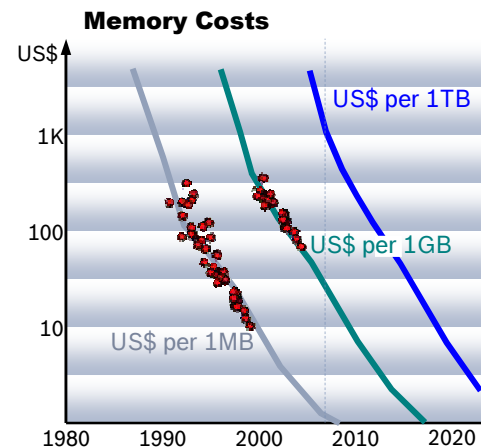
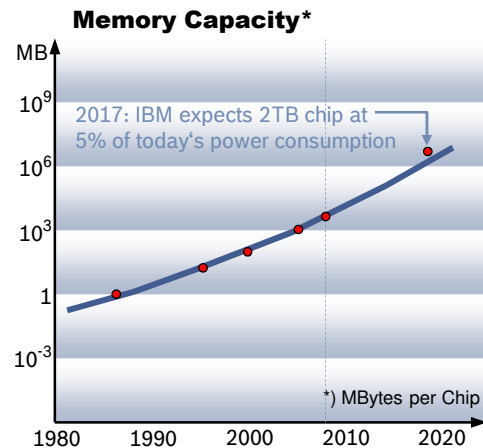
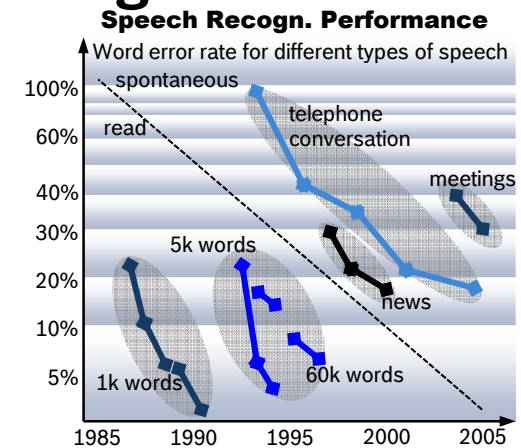
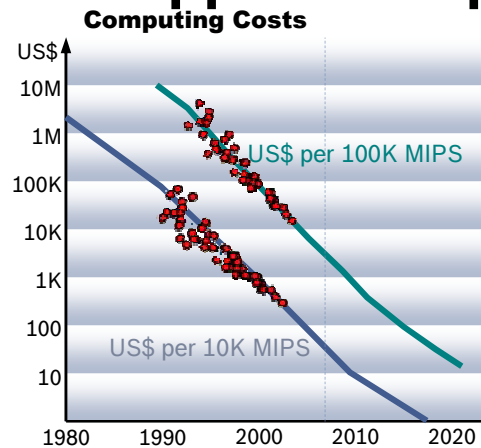
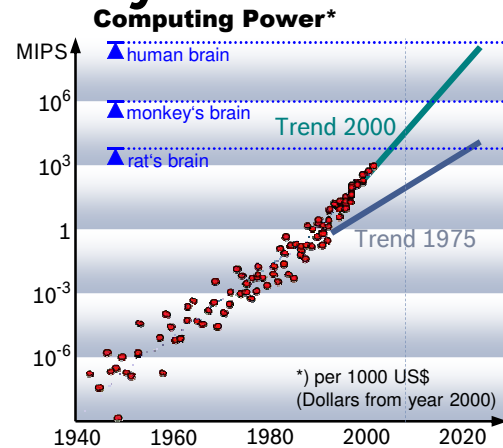
... will ...

- be aware of their location and offer location-specific services
- “see” and semantically understand their environment
- learn and evolve over time based on feedback
- be able to interact in a natural conversation
- plan actions based on an evaluation of their potential impact
- autonomously identify tasks and solve problems
- interact with other systems to jointly solve problems
- show intelligent behaviour by mimicking neuronal processes



Embedded Systems

Cognition is an enabling technology for new products in many markets and will support new paradigm shifts



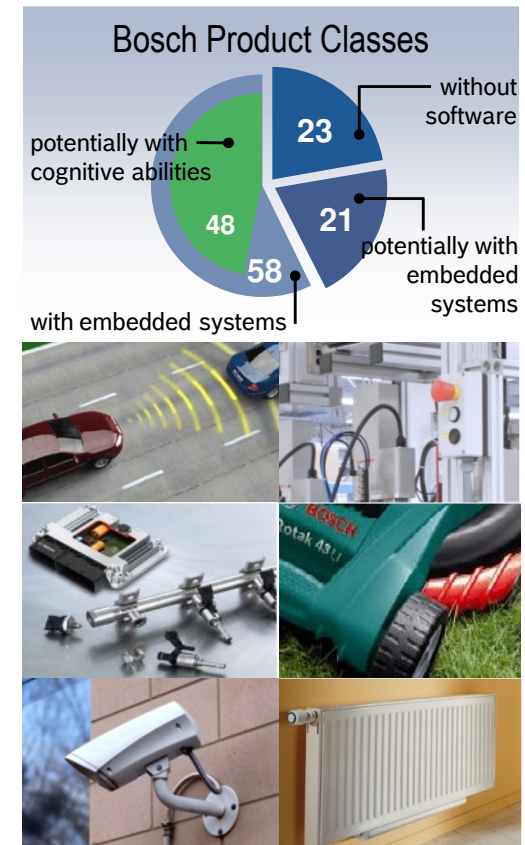
Embedded Systems

Cognitive abilities will become key product differentiators by making software-intensive systems smarter

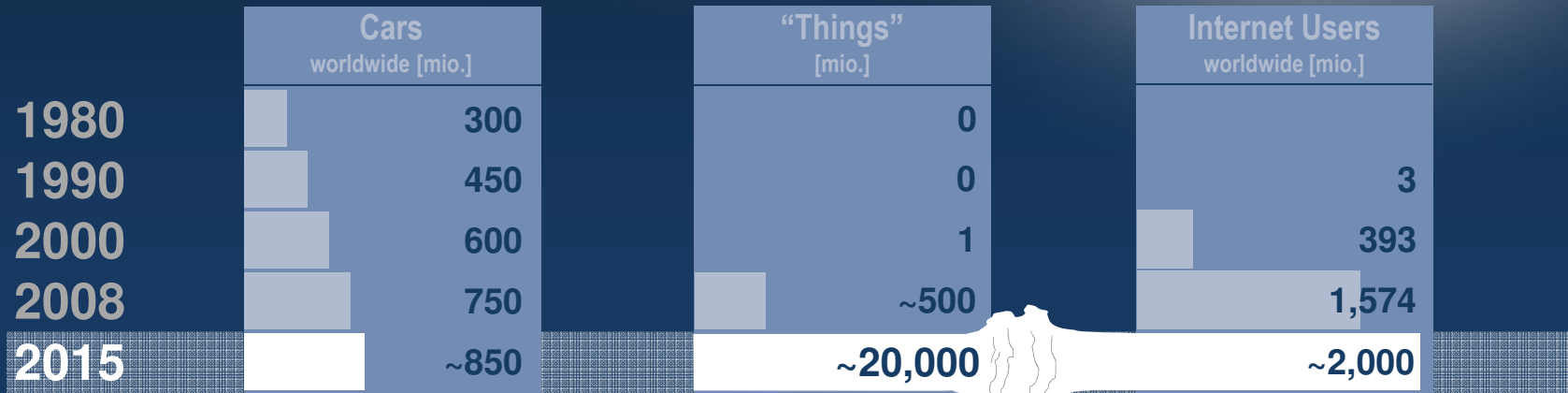
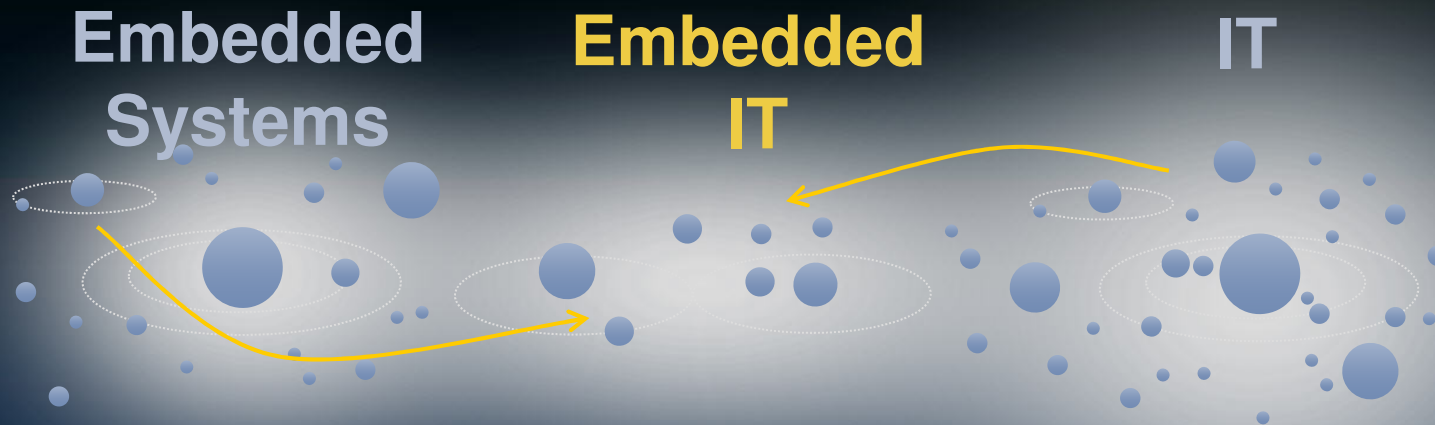
- With technology continuously advancing, customers expect products to perform more complex tasks and to act with greater autonomy
- Systems will have to “understand” their environment, analyze situations, plan and decide autonomously
- Smart software will be **THE** key product differentiator
- While “AI is, what computers can’t do (yet)”*, the Cognitive Systems discipline puts available proven technology to work in today’s and future products
- Focus is on implementing **The 5 Cognitive Abilities:**



*Sherry Turkle, Mass. Institute of Technology (MIT) AI=Artificial Intelligence



Embedded Systems



Technology Challenges

- Dependability (availability, reliability, safety)
- Security (privacy, identity, integrity)
- Timing (real time distributed connectivity)
- Resource efficiency (energy consumption, costs)
- Interoperability (compatibility, standards, semantics)
- Complexity (mastering engineering and management of systems)
- Autonomy



Embedded Systems

Embedded IT for software-intensive Systems!

- Computing power will be available in abundance, the winners will be who know what to do with it.
- Complexity will no longer be manageable: systems must manage their own complexity.
- Systems will become increasingly autonomous: systems recognize situations, form plans and act on them, they cooperate and negotiate with each other.
- Systems with embedded software will be pervasive and gradually converge with other IT Systems.
- From value chains to ecosystems

