Component Software for Embedded and Pervasive Systems

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Outline
- What is a component?
- Established component models
- Components in embedded and pervasive systems
- Conclusions

What is a component?
- Many definitions
- Szyperski (1998):
  "A software component is a unit of composition with contractually specified interfaces and and explicit context dependencies only. A software component can be deployed independently and is subject to composition by third parties."

What is a component? (cont'd)
- Reuse
- Composition
- Interfaces
- Deployment

Established component models
- JavaBeans
- Enterprise JavaBeans (EJB)
- COM, DCOM, and COM+
- .NET
- CORBA

Components in embedded and pervasive systems
- PECOS
- PCOM
- OSGi
- PalCom
PECOS
- “CBSE for embedded systems is far behind other application areas” (2002)
- Field devices at ABB
- A component model
  - Petri nets
  - A composition language CoCo
- A composition environment
- Restrictions
  - no binary deployment units

PCOM
- A component model for pervasive computing
  - More like established models
    - Uses a container
  - Scales down to tiny sensors (?)
  - Handles varying resource availability
  - Measured performance penalty from introducing components

OSGi
- For larger embedded devices
  - Set-top boxes, cable modems, routers...
- A dynamic set of components
- Builds on Java
- A framework provides communication facilities

PalCom
- Making pervasive systems more understandable for humans
- A new component model
- A virtual machine
  - Easily portable
  - Fits on small devices
  - Resource management

Conclusions
- Components are entering embedded and pervasive systems
- More so for larger systems
- Challenges include
  - handling extra-functional properties
  - adaptation to changing resources
  - trade-off between flexibility and performance
  - easily portable virtual machines for small devices

The end

Questions?