Improvements in the field of device integration into automation systems with embedded web interfaces

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Test bed automation

• Combustion engine test and development (CAT)
• Control the test bed in a defined mode (test run)
• Evaluate and control sensors, actuators and complex devices
• Acquire data, calculate and store results
• Real time behaviour
Device Integration

Software Part: solved!
- Device driver development
- Generic Solution for all measurement devices
- Configurable Device Handler
- Measurement Device Description (MDD)
- “Configuration instead of programming”

*ICINCO 2004
Device Integration

GUI Part: open issue!

- Device GUI needed for all platforms (test bed, PC, handheld, etc.)
- GUI needed for service and control of measurement devices
- No generic solution available
- High efforts concerning software development
Device Integration

Network Part: open issue!

- Measurement devices traditionally equipped with RS232 connections
- Problems with available connectors on the automation system
- Peer to peer, 9600 Baud, Master/Slave, no bus capabilities
- Not sufficient for dynamic engine tests
**Industrial Ethernet**

**Network Part:**
- High speed, bus connection
- Cheap & reliable components
- Standardized, available at any company

**GUI Part:**
- Embedded web server
- Incorporates web pages (html), files (ftp), programs (java)
- Additional interfaces (e.g. RS232)

*BECK IPC*
**EWI Concept**

**Gateway:**
- Embedded Web Interface EWI
- Highspeed communication gateway (RS232/Ethernet)
- Multi-client Ethernet connection

**Web Server:**
- Integrated device user interface (GUI, e.g. Java)
- Service screens shown in web browser, platform independent
**EWI Concept**

- Stand alone or integrated component
- Generic behaviour, usable for all measurement devices
- Parameterisation with a Compact FLASH Card
- *.INI-File (protocol definition, access arbitration, device detection, boost handling)
- Device GUI (Java, html)
- Service documents (ftp)
**EWI Performance**

**Gateway:**
- AVL Fuel Consumption Meter
- Transmission Time RS232->25ms
- Transmission Time Ethernet-EWI-RS232 -> 5.5 ms

**Problem:**
- Bottleneck in communication is the measurement device
- Protocol processing (AK-protocol) takes 100ms!
**Boost Mode**

**Measurement Device:**
- AK-Frames Master/Slave
- Only AK-Set/Adjust Commands
- Binary Boost Mode

**EWI:**
- AK-Inquire Commands taken from buffer
- Data rate increased in ranges of about 100Hz
- Timestamp in Boost data for offline evaluation
Future EWI steps

- Complete EWI measurement device integration at AVL
- Improvements of web server behaviour (upload GUI < 10s)
- Compact Flash replacement (SD card)
- Next version of BECK-IPC@CHIP SC23
- Gateway for RS485,CAN etc.
Conclusion

- EWI is a uniform, generic integration standard for test bed instrumentation
- Provides the user with a RS232/Ethernet gateway
- Gateway optimized for AK-protocol
- Performance improvement for 2Hz ->100Hz data rates
- Embedded web server provides the user with service screens and needed documents in the field.

... Device Integration got very easy
(if you understand the device well)
Thank you for your attention!