

# Replacing Hot Mock-up Functional Test: A Case Study.

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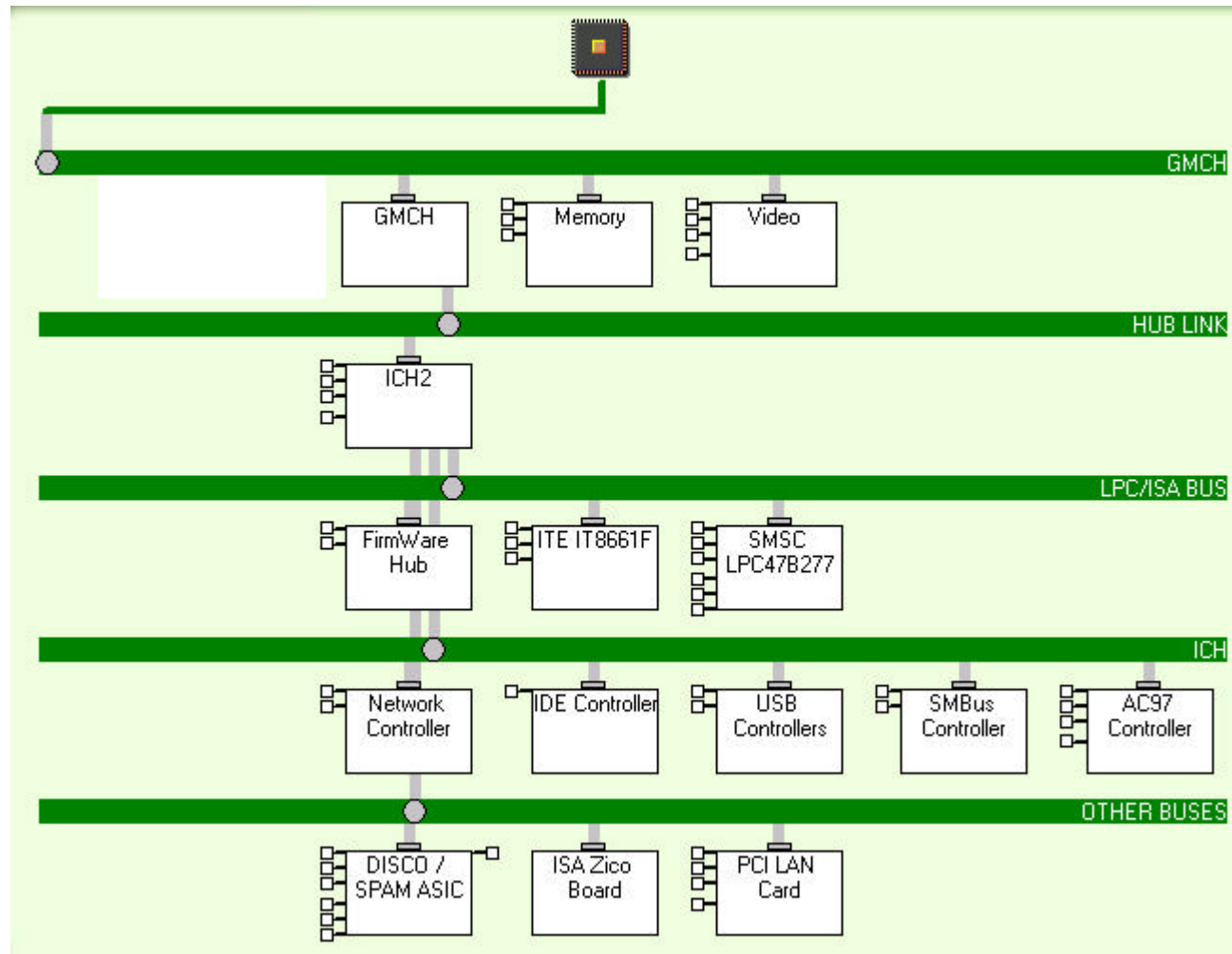
Billy Fenton, Int'l Test Technologies



# Outline

- **Board Under Test**
- **Hot Mock-up Test Solution**
- **Test Coverage and Time**
- **What is Emulation?**
- **Why Emulation?**
- **Emulation Test Solution**
- **Test Coverage and Time PLUS Diagnostics**
- **Added Benefits of Emulation**
- **Further Work**

# Board Under Test (Diagram)



# Board Under Test (Functions)

- **Intel Celeron Processor**
- **Intel 82815 GMCH**
- **2 x SDRAM DIMMs**
- **RGB video port**
- **Intel 82801BA ICH**
- **LAN Port (Intel 82562 PHY)**
- **IDE Primary and Secondary Ports**
- **AD1881A Audio Codec**
- **USB Port**
- **Firmware Hub**
- **SIO LPC47B27X**
  - **Keyboard/Mouse Port**
  - **Serial Ports 1 & 2**
  - **Floppy Disk Drive**
  - **Parallel Port 1**

# Board Under Test (Functions)

- **SIO ITE IT8661F**
  - Serial Ports 3 & 4
  - Parallel Port 2
- **SLC88B17 PCI-ISA Bridge**
- **PCI and ISA Bus Breakouts on NLX Connector**
- **Proprietary Parts**
  - SPAM
    - uC
    - RAM
    - COMMs
    - LEDs (Visual)
    - Switches

# Hot Mock-up Test Solution



# Test Coverage

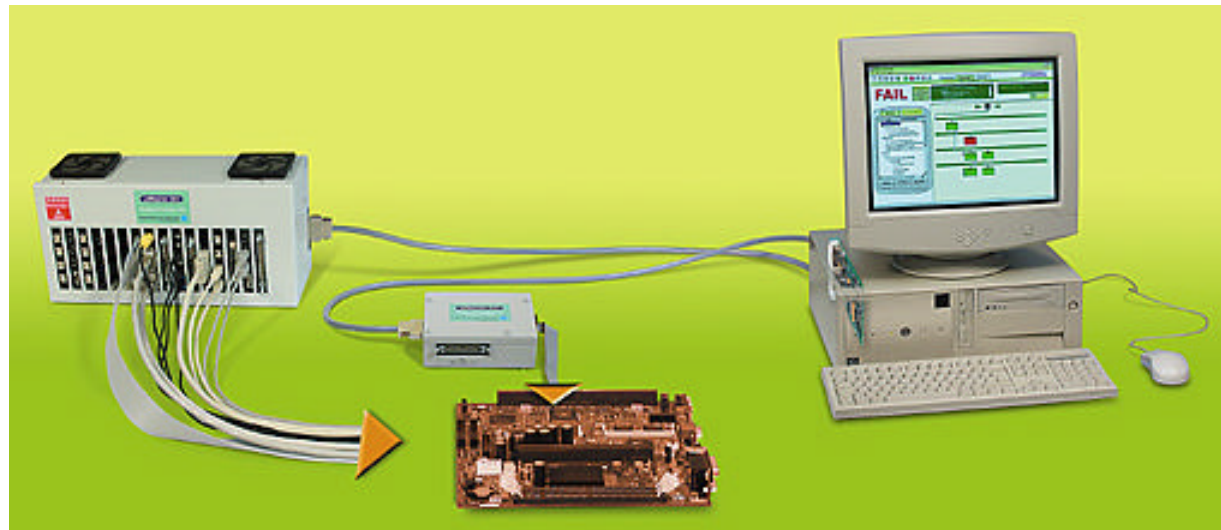
Function	HMU	EMUL
Intel Celeron Processor	Yes	
Intel 82815 GMCH	Yes	
2 x SDRAM DIMMs	Yes	
RGB video port	Yes	
Intel 82801BA ICH	Yes	
LAN Port (Intel 82562 PHY)	No	
IDE Primary and Secondary Ports	Yes	
AD1881A Audio Codec	No	
USB Port	No	
Firmware Hub	Yes	
SIO LPC47B27X	Yes	
Keyboard/Mouse Port	KB Only	
Serial Ports 1 & 2	Yes	
Floppy Disk Drive	Yes	
Parallel Port 1	No	
SIO ITE IT8661F	Yes	
Serial Ports 3 & 4	Yes	
Parallel Port 2	No	
SLC88B17 PCI-ISA Bridge	Yes	
PCI and ISA Bus Breakouts on NLX Connector	No	
SPAM uC	Yes	
SPAM RAM	Yes	
SPAM Comms	Yes	
SPAM LEDs	Visual Only	
SPAM Switches	Yes	

# Test Time & Diagnostics

- **Test Time = 8 minutes**
- **No Diagnostics**

# What is Emulation?

- CPU emulation uses an external instrument to take control of a boards CPU
- A remote PC can then be used to control a boards functional test sequence



# Why Emulation?

- **Bypass the boards OS to improve test time**
- **Improve test coverage**
- **Full control over test sequence**
- **Easy to implement board changes in a test sequences**
- **Diagnostics to bus and component level**
- **Error logging to Databases**
- **Remote control**

# Emulation Test Solution



# Test Coverage

Function	HMU	EMUL
Intel Celeron Processor	Yes	Yes
Intel 82815 GMCH	Yes	Yes
2 x SDRAM DIMMs	Yes	Yes
RGB video port	Yes	Yes
Intel 82801BA ICH	Yes	Yes
LAN Port (Intel 82562 PHY)	No	Yes
IDE Primary and Secondary Ports	Yes	Yes
AD1881A Audio Codec	No	Yes
USB Port	No	Yes
Firmware Hub	Yes	Yes
SIO LPC47B27X	Yes	Yes
Keyboard/Mouse Port	KB Only	Yes
Serial Ports 1 & 2	Yes	Yes
Floppy Disk Drive	Yes	Yes
Parallel Port 1	No	Yes
SIO ITE IT8661F	Yes	Yes
Serial Ports 3 & 4	Yes	Yes
Parallel Port 2	No	Yes
SLC88B17 PCI-ISA Bridge	Yes	Yes
PCI and ISA Bus Breakouts on NLX Connector	No	Yes
SPAM uC	Yes	Yes
SPAM RAM	Yes	Yes
SPAM Comms	Yes	Yes
SPAM LEDs	Visual Only	Yes
SPAM Switches	Yes	Yes

# Test Time & Diagnostics

- **Test Time = 3 minutes**
- **Full Diagnostics**

# Added Benefits of Emulation

- **Better Test Coverage**
- **Improved Test Time**
- **Diagnostics**

# Further Work

- **Remote control**
- **Translate functional errors to node/component level reports**
- **Calculating % test coverage**