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Analysis of State of the Art in Remote Control on a
KUKA KRC2 Robot Control

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12th International Workshop on Research and Education in Mechatronics,
REM2011, 15-16 September 2011, Kocaeli, Turkey

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OUTLINE

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I.   Introduction

Motivation: HBO uses remote access to laboratory equipment
since 2005 for hands on training
with private partner universities FOM, Essen and WBH, Darmstadt
on a Windows PC based plattforms

Since 2011: Extention of remote access to laboratory
equipment for mobile plattforms like iPad or iPhone

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I.   Introduction

Four level of remote access analyzed:

1. Local target

2. Access methods

3. Client devices

4. Client software

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II. Local Target

Local target: Target controller in the laboratory that should be remote controlled from outside the lab

Local target at AI2T: KUKA KRC2
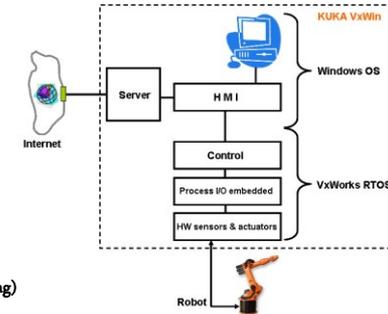with VxWin (VxWorks RTOS and Windows XP Embedded)

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II. Local Target

Remote access via server as
standard system component:
- RDP (Remote Desktop Protocol)
or not part of origin OS software:
- VNC (Virtual Network Computing)
- pcAnywhere
- KUKA.RemoteControl NSM

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III. Access Methods

- Standard internet connection via DSL with address
  resolve via DynDNS, active firewalls configured to allow access
  via port 3389.
- RDP may configured to use 128 bit encription keys, optional
  secured by using Transport Layer Security, TLS, former SSL
- For more security use a VPN tunnel. With PPTP,
  VPN guaranties secure access through university network to
  the target controller

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III. Access Methods

Design of the remote
environment at AI2T
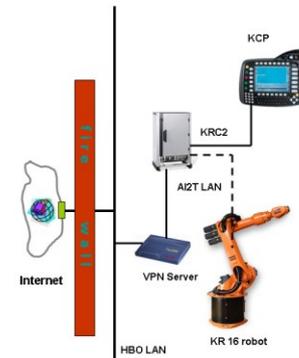
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IV. Client Devices

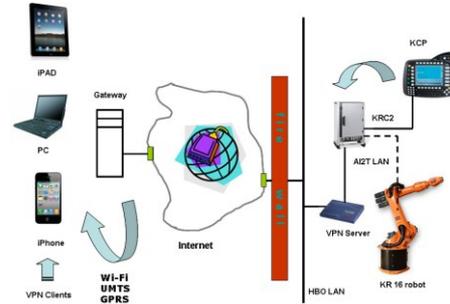Requirements for client devices:

1. Ability to establish connection from client device to internet through university network into laboratory network via VPN tunnel

2. Have a remote client software installed and running

➡ Most modern mobile communication devices like Smartphones, tablets, PCs and MAC computers can act as network clients

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V. Configuration at the AI2T

V. Configuration at the AI2T

Hard- and Software Components at AI2T		
Device		
	Hardware	Software
Local Target	KUKA KR 16, 6 axis articulated robot, KR2 control	OS: VxWorks RTOS Windows XP Embedded RMS: pcAnywhere, KUKA.RemoteControl NSM, UltraVNC, MS RDP
Server	VPN-Router: Vigor2300, Draytek	Protocol: PPTP
External Clients	PC	OS: Windows7 Client: Smart VPN, Draytec RMS: pcAnywhere, KUKA.RemoteControl NSM, UltraVNC, MS RDP
	iPhone4 iPAD2	OS: iOS 4.3 Client: VPN RS: VNC

VI. Online Demonstration

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Robot Laboratory

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VII. Conclusions and Future Prospects

1. Basic possibilities of remote control of windows based laboratory
   systems are examined.

2. Hard- and software solutions for
   local targets, access methods, and remote devices and tools are
   analysed and described (please see paper for details)

3. The analysis shows that remote control and monitoring of a robot
   or other industrial plants can be implemented with current state
   of technology at low costs and high safety standards

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VII. Conclusions and Future Prospects

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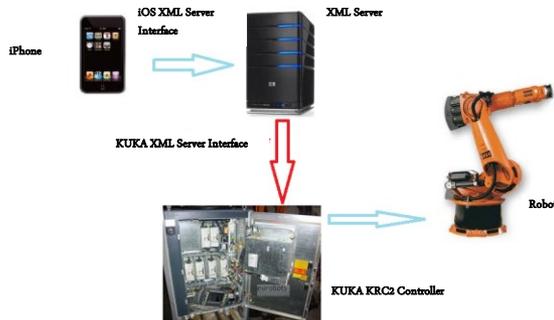

VII. Conclusions and Future Prospects

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Thank you for your attention!

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