

Mobile Learning with PDA's and Mobile Phones

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Mobile devices such as notebooks and PDA's are very interesting tools for web-based teaching and distant teaching today. By the development of wireless communication networks like portable mobile phone networks (GSM, GPRS, UMTS) and local wireless networks (WLAN), electronic teaching material can be accessed from any location. Web based remote laboratory environments have been adapted to mobile devices like PDAs and smartphones [1]. Since not all implementations of PocketPC are supporting an ActiveX control integration to a web page and ActiveX is not available at all on other platforms than Windows, an alternative solution was chosen. On typical PDAs the Java virtual machine (JVM) is not fast enough to decode MPEG4 in real time. But with the help of the open source 'kuttpech' applet [2], it is possible to decode up to 3 frames per second of a MPEG1 video stream on a PDA. For Linux based PDA's, the 'VideoLan player' is an alternative to display MPEG4 content. 'Personaljava' is a Java runtime environment for mobile devices with limited resources. The newer and better known J2ME standard is divided in different profiles and configurations. The Mobile Information Device Profile (MIDP) in combination with the Connected Limited Device Configuration (CLDC) is implemented on most of today's mobile phones. The J2ME (CLDC) application environment (MIDlets) does not allow a seamless integration of streaming clients with an MIDlet user interface (GUI). Different to J2ME (CLDC) the J2ME Connected Device Configuration (CDC) and its predecessor 'Personaljava' are providing the full AWT (Abstract Window Toolkit) API.

Like on standard PCs 'Personaljava' allows an integration of a Java virtual machine into the web browser of a mobile device. Implementations of 'Personaljava' are available for Windows CE, Linux, Palm and Symbian OS based PDA and mobile phone platforms.

With the help of the described techniques an existing online experiment (remote control of a mobile robot) has been adapted to a pure Java PDA and smartphone environment (Fig. 1). The modified client Java applets are running on a 'Personaljava' virtual machine.



Figure 1: Pure Java PDA interface to online experiments

[1] <http://prt.fernuni-hagen.de/pro/pioneer/>

[2] <http://kuttpech.sourceforge.net/>

[3] A.Bischoff: M-Learning with Remotely Operated Laboratories, Virtual University 2006, Bratislava 2006