

Public Abstract

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Multimedia Data Transmission for Mobile Wireless Applications

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With the novel advances in wireless communication and IT industry, personal mobile handheld devices, including pocket PCs and PDAs, are trying to incorporate web browsing, image and video capture, streaming video functionality. Growth in demand is steady for interactive multimedia, in particular image and video communications. However, the requirements for mobile wireless application are different from those for wired PC broadcast applications. For instance, mobile wireless applications are typically comprised of low-power devices with limited battery charge times, and low-bandwidth networks that are prone to channel loss. Robust and energy efficient transmission are very desirable in mobile wireless applications.

In this dissertation, we start by addressing robust multimedia data transmission for mobile application. The first topic is proxy-based handheld device access to live NASA satellite weather images. The second topic is a real time easy-to-use 3D volume visualization system on mobile handheld devices. Experimental results show the system can achieve good performance under the restriction of limited wireless channel bandwidth and resource of wireless device.

We also address energy efficient transmission for mobile application. The first scheme is a collaborative image transmission scheme. The second scheme is multiple bit stream image encoding and small fragment burst transmission system. We demonstrate that the transmission energy can be greatly reduced, and the transmission strategy matches well with the media access control layer protocol as well as the link layer protocol.

Finally, we address the research of applying distributed source coding in image and video coding. We show that applying distributed source coding in multiple description image coding improves the error resilience, and our syndrome-based video encoding scheme provides low complexity video encoder that is very desirable for mobile wireless application.