Chapter 27
Effortless Data Capture for Ambient E-Services with Digital Pen and Paper Technology

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ABSTRACT

In order to counteract the digital divide and to enable the society to reach all its citizens with various kinds of e-services, there is a need to develop access methods and terminal technologies suited also for groups with weak access to the Internet, not the least elderly and people needing care in their homes. In this chapter, the authors will describe technologies for using digital pen and paper as data input media for e-services and computing applications, refer a number of applications together with studies and evaluations of their usability, and finally comment upon future prospects for integrating digital pen and paper as an effortless technique for data capture, especially in order to counteract and diminish the digital divide. The use of digital pen and paper technologies is exemplified with applications demonstrating its appropriateness in home care for elderly, for free-form recording of data on paper such as maps, and as a remote control for a TV set or other electronic appliances with rich functionality in the home.

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INTRODUCTION

The modern information society assumes to an ever increasing degree that the citizens can utilize the Internet and computing appliances for getting information, paying bills, buying things and to communicate with healthcare and public sector service suppliers. However, quite a number of people find it difficult to access and manage e-services and standard computers, due to the general complexity and lack of convenient terminal designs and user-friendly interfaces for the inexperienced user. In order to promote convenient access to e-services for all citizens, not the least for the elderly, there is a need for consumer-oriented solutions for everyday e-services enabling access to IT-based services also for individuals with a low propensity to use computers and Internet.

Standard computers are becoming more and more affordable and are available for a large part of the population. Mobile phones and handheld computers offer alternative modes of access to Internet-based e-services. But in order to effectively deal with the digital divide, and also to offer convenient access to e-services in special situations, still other terminal devices may be required. For elderly and infrequent users of computers, neither standard PC systems with complex operating systems – subject to recurring changes not the least for security threats – nor mobile phones offer convenient interfaces with a low access threshold.

Thus, there is a quest for new types of access terminals suited for users and situations, where ease-of-use with respect to requested services is a prime requirement. Not the least is there a need to improve availability to public e-services for the elderly and groups of users with some kind of functional handicaps.

A core activity in getting convenient access to everyday e-services is support for effortless data capture, i.e. easy ways to enter information into a digital system, be it for recording of data or for controlling some kind of service (or device). For public places examples of such services can be buying a fare ticket, self-scanning in a food store, registration in connection with a hospital visit or reserving a parking space. In these cases some kind of touch-screen terminals are becoming more and more usual. For home-based applications, this technology has a more limited applicability, even if more advanced mobile phones may offer this kind of interaction mode.

In this chapter, we will focus on semi-mobile applications in the home and describe technologies for using digital pen and paper technology as data input media for e-services and some computing applications. We will exemplify opportunities with a number of innovative applications together with documented studies and evaluations of their usability. In particular, we will comment upon future prospects for integrated use of digital pen and paper as part of combined solutions for easy access and maneuvering of various kinds of e-services, especially in order to counteract and diminish the digital divide in the society.

Thus digital pen and paper technology offers an interesting opportunity for data entry, with a low access threshold and easy-to-use qualities. By employing artifacts such as pen and paper, which are well known to most people, the threshold for acceptance of new technology may be comparatively low. It is also important to offer solutions with a smooth learning process, encouraging the user to start directly to use the system and then gradually acquiring enhanced skills in utilizing the full functionality of offered services.

BACKGROUND

Throughout the history of computing, there has been an interest in using some kind of pen or stylus for convenient input of data, relying on skills and habits familiar to the ordinary user. Several technologies for recording and transmitting what is written have been tried, also for home applications (Venkatesh, 1996). We will in this chapter shortly