Mobile Pen-Based Technologies for Drivers Licence Administration

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Abstract: One of the major advantages of mobile computing devices is that they facilitate data capture when the operator is on the move. The data collected can be readily processed for analysis and reporting purposes, without the need for manually transcribing the data into an electronic form. This paper describes the design and development of two prototypical systems using mobile pen-based technologies for the administration of learner drivers licence testing. We highlight some of the design issues and report the lessons learned.

Keywords: Drivers licence administration; Mobile devices; Pen-based devices; Pen-based system applications

1. Introduction

Although Australia is a highly urbanised country with an efficient public transport system in its major cities, the affordability of motor vehicles, the availability of an effective road system and the low cost of fuel have all contributed to a high motor vehicle ownership rate. Australia is a vast country, consisting of six states and two territories, but it has a small population by world standards. The states and territories are responsible for maintaining the road and traffic systems. Although the country is gradually moving towards a uniform national road law system, it is envisaged that each state and territory will continue to administer its own driver licensing operations through its respective road and traffic authorities. In populous states like New South Wales and Victoria, the road and traffic authorities administer over 100,000 tests a year through a large number of suburban and rural offices. Because of Australia's high vehicle ownership rate, the administration and management of the learner drivers licence tests is a huge and labour-intensive operation. Therefore, technologies have much to offer, not only making this operation more efficient and effective, but also improving the quality and reliability of each test and the authentication process.

The advent of mobile computing devices has brought about many novel applications that enable the user to perform useful work on the move. Mobile pen-based devices in particular are gaining wide acceptance because of their natural physical interface and the ability for the user to input data without a keyboard. Despite their compact size, the computational power of these devices available nowadays is comparable to that of an average desktop machine only 3 years ago. Consequently, these devices are suitable for a diverse range of applications, such as real-time data capture [1]. When coupled to a global positioning system (GPS), these mobile devices can support location-aware applications [2] that automatically trigger information relevant to the user's current location. For example, GUIDE, an intelligent online tourist guide proposed by Davies et al [3], can provide information about sights in the user's vicinity.

This paper describes the design and development of two prototypical systems using mobile pen-based technologies to facilitate the administration of drivers licence testing for VicRoads and the New South Wales Roads and Traffic Authority (NSW RTA). The first system was based on the Apple Newton 130 and the second on the Cassiopeia PA2400. The design and development of the two systems was carried out over a 30-month period, during which pen-based technologies advanced at a remarkable rate, both in terms of hardware and software.

In the following sections, we provide some background information about the on-roads drivers licence test and detail the system requirements for a mobile device, highlighting the advantages of the electronic mobile device over the current paper-based system. We then describe the system design rationale and the implementation using the two different hardware platforms. A preliminary trial was conducted for each hardware platform to...
examine system effectiveness and user acceptance, and its results are reported. Finally, we compare the two systems and discuss the lessons learned in this project.

2. The On-Roads Drivers Licence Test

The learner drivers licence tests used by VicRoads and NSW RTA, respectively known as POLA (Programmed Observation Licence Assessment) and DART (Driving Ability Road Test), are well structured and objective on-road tests, designed to measure driver behaviour along a test route against predetermined criteria. Because the test is administered at different locations by a variety of testing officers across the state, it is essential to ensure that all test routes are at an equal level of difficulty and that testing officers are applying the criteria consistently in the assessment of the learner driver's performance, i.e. inter-rater reliability must be high.

There are a number of test offices serving suburban districts and rural regions across each state. Each test office has a number of predetermined test routes. The POLA and DART tests are very similar in concept and in operation. The on-road learner drivers licence test consists of three components of assessment: continuous performance checks, positioned performance checks and special...